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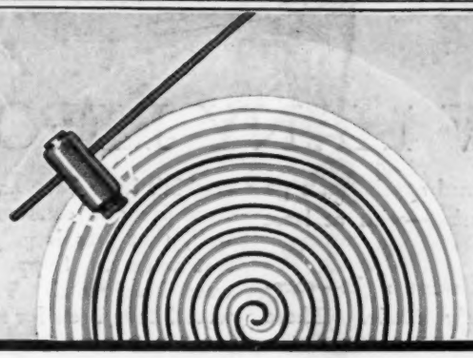

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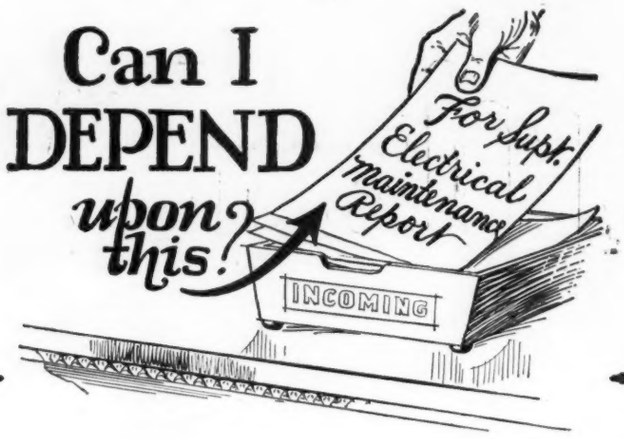

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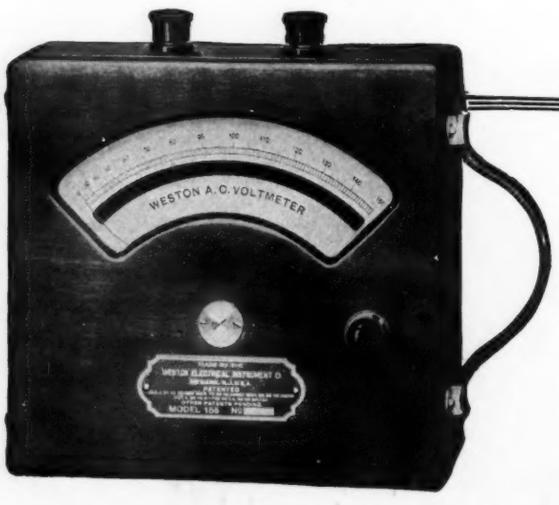

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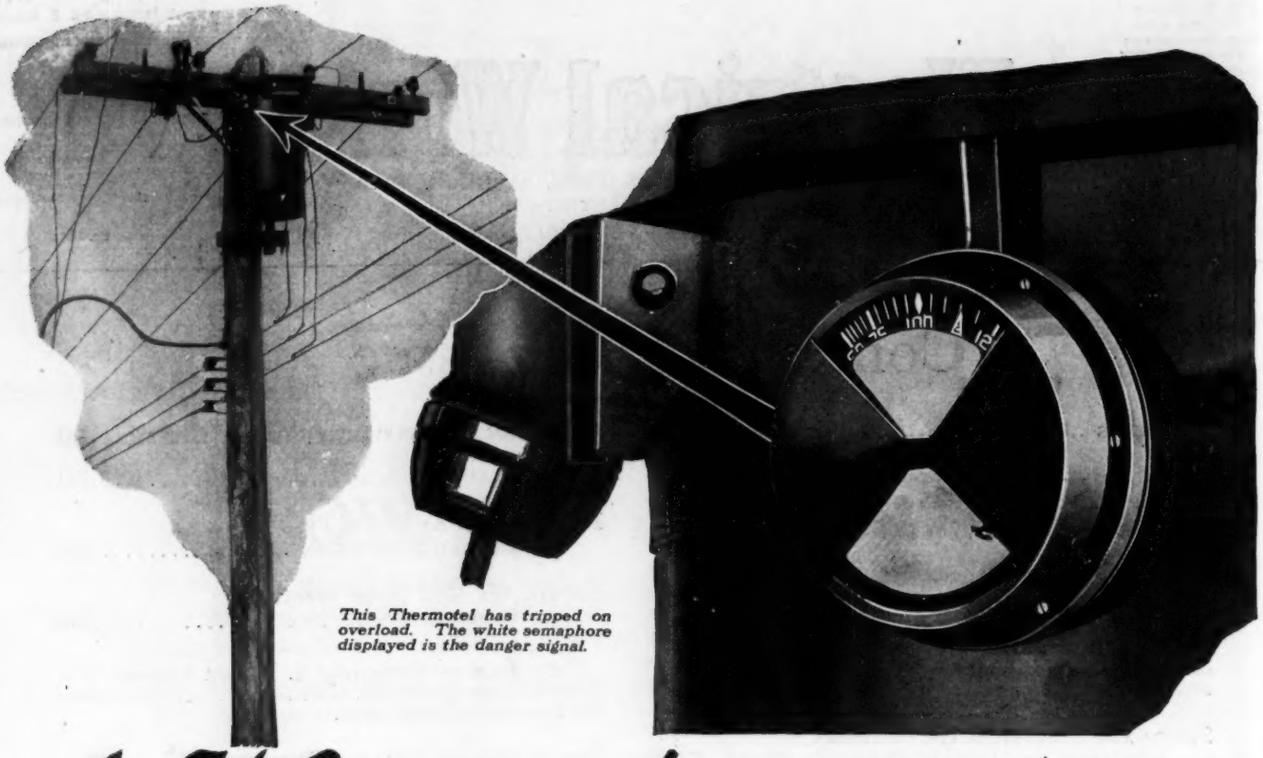

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Electrical World

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W. H. ONKEN, JR.
Editor

VOLUME 90 — *New York, Saturday, October 8, 1927* — NUMBER 15

Radio's Contribution to the Electric Light and Power Industry

WHATEVER one may think of the Tunney-Dempsey prize fight, or however much one may lament the enormous returns paid to the contestants, who with no investment save trained fists in less than an hour reaped a profit of considerably more than a million dollars, the fact remains that world-wide interest was concentrated on the arena at Chicago. Moreover, the electric light and power industry and the radio industry have every commercial reason to regard such contests with favor; for statistics indicate that the recent prize fight brought plenty of grist to their mills.

The claim has been made that radio is a boon to the electric light and power industry, because its employment results in longer hours' use of electric light. Substantiation of that claim has now been definitely made. In one city alone—New York—one of the electric public utility companies experienced a remarkable increase in load on the night of the prize fight. Beginning at 9 o'clock, the load on the system was above normal until 3 o'clock the next morning, reaching a peak at about midnight approximately 50,000 kw. above normal. This tremendous load was due entirely to the fact that people were listening to the radio broadcast of the fistic encounter. Doubtless other systems can show somewhat similar load characteristics attributable to the same event, indicating what an asset radio is to the electric light and power business.

* * * *

Cheap Power Is Not the Question

AN ENORMOUS load for development by electrical men exists in the processing of natural resources such as coal, wood, oil, metals, earths and gases. The chemist, physicist and engineer have indicated clearly many new things which can be used in industry. Most of these processes require power, and many erroneous conceptions exist as to the importance of the price of this power and its influence on the commercial development of these new industries.

None of those engaged in the development of new electrochemical and electrometallurgical industries expect power at, say, ten dollars a horsepower-year. They know that firm power cannot be made and sold at much less than twenty dollars a horsepower-year. They have no misconception as to the fact that steam-electric power and hydro-electric power are equally expensive in this country. Each industry, with such exceptions as electrochemical and electrometallurgical plants, knows that even if its power bill were doubled, this would increase its production cost hardly one per cent.

Those who would secure these new industries for their localities would do well to talk less about "cheap" power and more about other things which are conducive to the development of successful industries. A survey of the resources of the territory is a fundamental starting point for commercial development. It is necessary to know the raw materials available, the labor conditions, the tax conditions, the legal requirements and the markets. In many instances local money will be sought, and the investment capacity and willingness of the community should be weighed. Generally, advertising is of little value unless followed by salesmen armed with convincing facts. The proper approach is to find out what the local territory possesses and then to select the industries which can use these resources to best advantage.

* * * *

A Challenge to Able Leadership

ALL that is best in the leadership of the electric light and power industry was summoned into service by President Samuel Ferguson of the Association of Edison Illuminating Companies at last week's convention in Colorado Springs. He minced no words in emphasizing the critical period through which the industry is passing from the standpoint of economic development, political attack on a national scale and threatened impairment of equitable regulation. The era of rapid expansion by the addition of the residential customers has passed its climax. The vastness and wonderful success of the electric utility business has drawn the fire of self-seeking national politicians and of restless reformers with socialistic leanings, and the incentive of adequate reward for superior management is too slowly being recognized. Industry values are changing, and again its leaders are called upon to manifest their phenomenal adaptability to meet and solve new problems of momentous consequence.

These changes in values demand new conceptions of utility service in relation to the public and to the investor. Residential usage of electricity averages but 400 kw.-hr. per year, whereas a thoroughly electrified household can use at least 16,000 kw.-hr., and many do so. The straight-line meter rate, after many years of excellent service in attracting new customers, has earned honorable retirement, and the promotional type of rate is on its way to the front line of activity in both residential and rural service fields. Upon such a rate rests the burden of a great expansion in the immediate future—an expansion of surpassing economic importance to the public and to the service organizations alike. We regret

that full recognition of the value of promotional rates is still to be attained, but their progress cannot but be speeded by such utterances as Mr. Ferguson's, based as these are upon intimate experience involving much pioneering and tested by years of successful application.

The incentive of reward in the shape of lower unit prices for increased service lies at the bottom of promotional-type rates, and this stimulus is likewise fundamental to the success of private ownership and adequate regulation. Agitation for the entry of the government into the power business, no matter how camouflaged in the trappings of water supply, stream-flow conservation, transportation or industrial betterment, spells the end of private initiative in America if generally adopted and maintained. Merited commendation of the work of the Joint Committee of National Utility Associations under Mr. Cortelyou's chairmanship should not cause industry leaders to relax their own vitally needed aid in the task of demonstrating that the advent of the government into this field is politically unwise, economically unsound and competitively unfair. And, finally, the fallacy of adhering to the "cost-plus" conception of regulation, which eliminates any incentive to economy, calls aloud for consideration. The incentive of reward for able management needs to be realized, whether exemplified in savings from interconnection, unified administration, business development or high-grade engineering. Recognition of the new industry values by the public and by those who serve it is the sure reward of that devoted work which is the price of progress.

* * * *

Factors in Rate Making

SO MUCH discussion of the place of different rate-basing methods has filled the air of late that there is danger of overlooking the essential broad treatment of regulative problems by commissions responsible for making fair decisions in disputes over the price of service. In the long run the return on the utility investment must be sufficient to pay all proper expenses and overheads and then attract capital for future development if properties are not to stagnate. This return is derived from gross revenue primarily, but it also depends upon the skill with which costs are controlled. Its determination is not so simple a problem for a regulating commission as is sometimes implied.

If a responsible decision in a rate case depended merely upon ascertaining the prudent investment, for example, the computation presumably could be made by a few clerks equipped with slide rules and adding machines, and much the same thing would be true if the commission were furnished with an acceptable valuation on the reproduction-cost-less-depreciation basis. We are inclined to believe that the rate base, important as it may be, has been somewhat overemphasized of late in comments upon commission findings, and that too little credit is being given for the consideration of other factors bearing upon price decisions. Among these are the current return on money in various fields, the general condition of business in localities concerned, capitalization policies, the purchasing power of the dividend dollar in the past, at present and as anticipated; the character of management; commercial progressiveness, relations with public and employees, yield on various market prices of the company's securities, relations with other utilities and holding organizations, and general plant and system efficiency. It is well to realize that a capable commission rarely confines itself to the evidence produced at public hearings, and that while it may be guided by precedents and moot theories in reaching its conclusions, a well-rounded decision involves and usually is determined by a far more comprehensive investigation than doctrinaires like to acknowledge.

* * * *

Rural-Line Standards

TWO or three years ago it was too early to standardize the construction of rural lines, because the information now collected on the nature and possible magnitude of individual farm loads, importance of service, etc., was not then available. Even now it may be inadvisable to adopt too rigid farm-line specifications or think of universal standards because load densities in different farming communities vary and will probably never approach a parity. Furthermore, it may be possible that the national effort to develop individual farm loads may create rural markets in some sections that will surprise the most pessimistic.

At the present time, with the wealth of information available on farm applications, the engineer is in a much better position than a few years ago to formulate line specifications. The Wisconsin Power & Light Company, the West Penn Power Company and others have done so. These standards should be of value to various men in utility and electrical manufacturing circles. For the utility executive the specifications indicate what type of service is considered essential for farmers. In such specifications and in market studies utility executives and commercial managers will have the basis for studying the economics of rural service and formulating rates. Electrical engineers, superintendents of distribution and construction men will find in the specifications elements that they may desire to incorporate in their own standards. Manufacturers of line material and electrical equipment will have a picture of what rural service involves so far as service equipment is concerned.

* * * *

Dreams of Luxury Lighting Come True

A LITTLE more than a decade ago only a few lighting specialists were preaching the artistic and, more broadly, the psychological possibilities of artificial lighting. They were generally tolerated as dreamers, but few took them seriously. As the years passed the use of light in these directions grew steadily but so quietly that one is astonished when he compares the present with a decade ago.

For example, in the former period the theater monopolized lighting effects which were designed to impress audiences. Today display rooms, auditoriums, lodge rooms, restaurants, ballrooms and even churches are equipped with lighting possibilities quite beyond those needed for the ordinary requirements of the crowds. In many cases the "extra" effects represent a lighting load a dozen times as great as the ordinary lighting requirements. Even now, with this so-called "luxury lighting" just getting under way, the consumption of electrical energy and lighting equipment is appreciable. But the idea has not stopped in the places catering solely to large gatherings, for it is spreading everywhere. This is a colorful and revolutionary

age—and relatively extravagant too. The possibilities peculiar to modern controllable light play well into the present-day demands. Therefore, on every hand are potential customers for what was formerly luxury lighting. Even the home has not escaped, for these legitimate lighting effects have invaded the sun room, the dining room and even the front porch, as is indicated by the colored lamp over the doorway.

Why not? Artificial light is no more to be restricted merely to ordinary lighting for the bare purpose of aiding sight than paint is to be restricted to the preservation of materials. Lighting has enormous esthetic possibilities just as painting has. And lighting has the advantage of control by switches—to be used when, if and as desired.

* * * *

Why Industry Is Electrifying

INDUSTRY today is confronted with high labor and material costs on one hand and with keen competition, causing lower selling prices, on the other. Profits are possible only if quality is maintained or improved while manufacturing costs are forced down a little ahead of the drop in prices of finished products. Production men are faced with the problem not so much of increasing plant capacity, but of operating existing plants on rigid production schedules, with the least amount of spoilage, the fewest possible interruptions and at the maximum over-all economy. The greatest barrier to any program of manufacturing economies is the uncertainty and failure of the human element. It is for this reason that plant production managers are turning so rapidly to complete electrification, which reduces to a minimum the possibility of human error.

Industrial electrification means not only motor-driven machinery but the electrical operation of production lines and heat-treating processes under automatic control and regulation that is also entirely electrical. In nearly every instance the installation of electric drive or heating apparatus has resulted in a direct saving in operation compared with that of the equipment replaced. But other economies and advantages far exceed the gain in power cost alone. In the case of automatic machine tools it is possible for one man to operate a battery of machines where formerly he could operate but one. With automatic electric operation and control his duties are more supervisory than manual; he becomes a director of power instead of part of the power supply. In assembly lines each operation can be systematically timed; no one man is hurried while another waits idle for him to finish. If work piles up at some point, it is possible to spot almost immediately the cause of trouble and correct it. Time studies, power requirements, tests of machine efficiency can easily be made under electric operation.

With electric heat-treating processes it is possible day after day and month after month to duplicate an exact hardness, anneal or case depth on metal parts. The same quantity of material can be turned out in a given time, its quality will be uniform and rejections minimized. Working conditions are improved and labor cost per unit manufactured is reduced. Another result of electric operation or electric heat-treating, aside from direct labor-saving features, is the fact that a better class of labor can be had. In these days of high labor costs, and that labor which is available of an indifferent character, ability to attract higher-grade, more intelligent workmen is an important consideration to production men. Electric operation and control of industrial processes make them well nigh foolproof. They reduce the possibility of human error to a minimum and quite often result in unexpected savings in production costs, increased plant capacity and a better quality of product. It is because of these elements that industry is being more completely electrified every day and production men are finding an effective means of combating manufacturing costs.

* * * *

A Business Flywheel

EVERY industry is a distributor of money in its own community. The electric service company is no exception to the rule. On the average the electric light and power industry in this country spends over $2,000,000 daily in the form of operating expenses and maintenance. By far the greater part of this large sum is, directly or indirectly, for labor or services. Even the expense for fuel is essentially a labor charge for mining and transportation. The balance of the expenditure the local company sends out into the community it serves and in which its employees live.

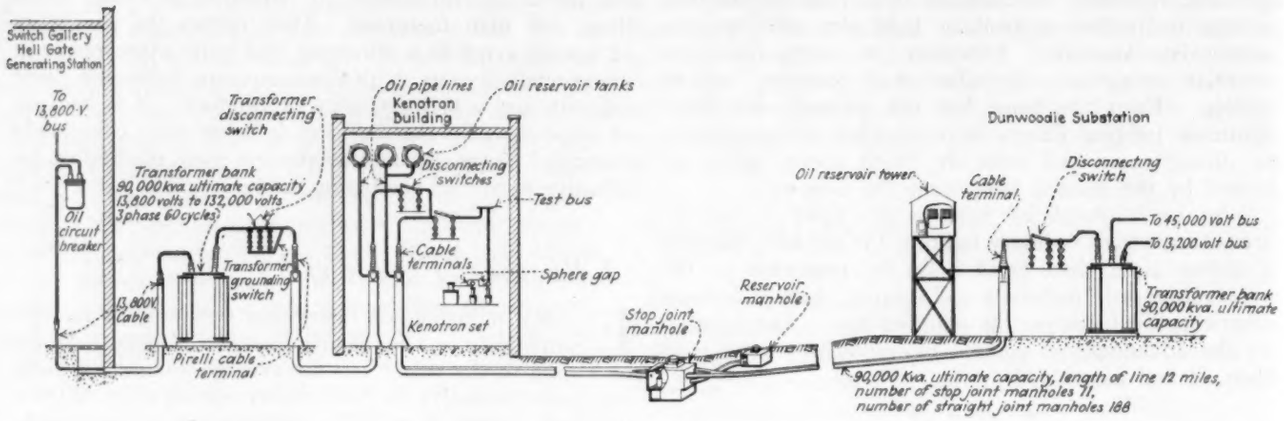
This average daily outgo is remarkably steady. Considered month by month, it has varied less than 3 per cent, with a single upward exception, since the beginning of the present year. The industry, with its two hundred thousand employees, thus acts as an important stabilizing agency in local business; it knows no periodic shutdowns for "taking stock," nor is it subject to serious seasonal unemployment except in the colder parts of the country where outside construction is curtailed during the winter. The generating stations must run, outside plant must be maintained, meters read, service calls made, accounting carried on, clerical and other activities must continue. The revenue fluctuates with the seasons, but the outflow of wages and salaries is steady, to the distinct advantage of local merchants.

* * * *

Electricity in Metal Mining

TRADITIONAL methods of mining, smelting and refining have been slow to change in the metal-mining industry. But lower-grade ores, lower prices and the necessity for mass production have altered conditions. The incentives to cut costs have been great and buyers are demanding a better product. In the copper industry the electric shovel, the electric hoist, electric power drives and electric refining are now accepted as the best means to assure economical production. The applications of electricity have brought about the tonnage and the purity which meet the economic necessity of this industry. Recent developments show that in lead and zinc production the electrodeposition process is going to dominate. At Trail, British Columbia; Great Falls, Mont., and Wallace, Idaho, large plants are operating or under construction. In these regions alone upward of a thousand tons of zinc per month will soon be produced by electrodeposition. The electrical process is cheaper and makes a better product.

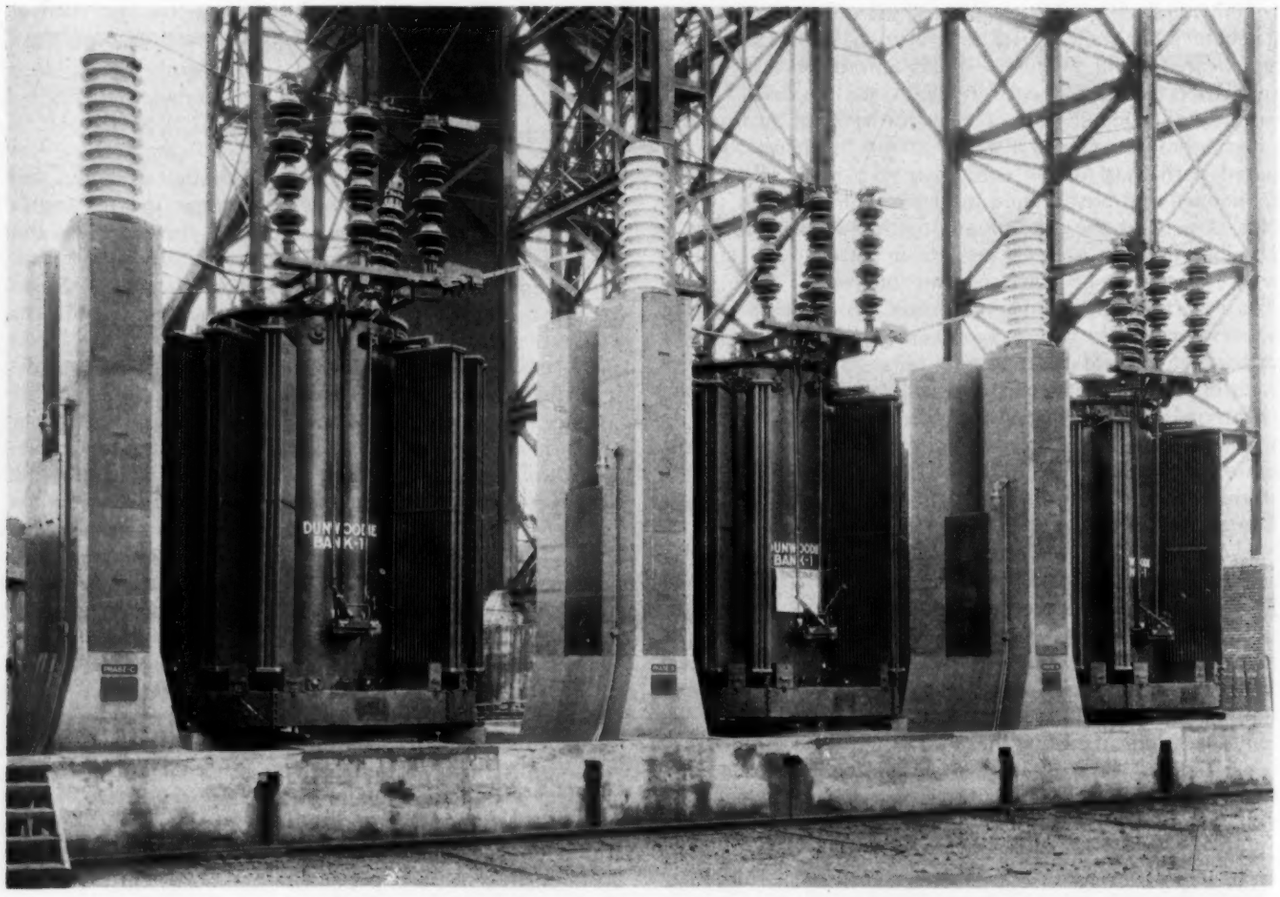
Experiments are under way to electrodeposit white lead and various other minerals, and hopes are held out for refining many complex ores which are not capable of being produced economically by other means. Electrochemical and electrometallurgical processes are dominating the mining industry as never before. Only the air drill persists, and no doubt this will be replaced by an electrical tool of more potency.



132-Kv. Underground Cable Installation

THE placing in service of the 12-mile, 90,000-kw., 132-kv. cable installation from the Hell Gate station of the New York Edison-United Companies to Dunwoodie was announced in the Aug. 13 issue of the ELECTRICAL WORLD. At that time some of its features were briefly related. In general it involves the use of single-conductor, hollow-core, oil-filled cable, oil pressure being maintained by elevated reservoirs at intervals between terminals in order to avoid gas voids. About every mile throughout the run are stop joints which permit electrical continuity, but sectionalize the oil. On this page and pages 734, 735, 736 and 737 of this issue are pictorially presented some of the features of installation, including terminal and intermediate equipment, method of installing cable, preparing oil before installation, evacuation of cables after installation, method of making joints, etc.

The general layout and cable terminals are shown on this page.



Economics of Utility Service*

Expansion depends upon increased use by present consumers. Promotional rates needed for equitable inducement. The value of private ownership. Rural service expansion a co-operative problem.

By SAMUEL FERGUSON
President Association of Edison Illuminating Companies

ELECTRIC light and power companies are continually making their services more valuable and essential to the communities they serve, both in finding new ways of usefulness and in making the old uses more and more generally available. This causes our industry to continue its phenomenal growth with unabated speed in spite of the fact that to a very large extent new customers now can only come from the increase in population instead of being, as heretofore, available as soon as we could convince them of the desirability of our service.

This fundamental change of condition is recognized as requiring a change in policies, since those methods which were for the past 40 years excellent for acquiring new customers are no longer applicable to stimulating the use of current by those we now have on our lines. The straight line meter rate was pre-eminently suitable for stimulating the acquisition of new customers from the very fact that under it the liberal user, to a large extent, carried the burden of the new and timid users, who needed to be attracted to the service. But with changed conditions, it is only with a promotional type of rate which will automatically accord to liberal users the lower prices which are due them that we can hope to continue to stimulate the amount of use which is so essential under this changed condition of our companies.

The other policy which this changed condition renders obsolete is the encouragement formerly given to partial or inadequate wiring of homes. We wanted the unwired houses to come onto our lines, and only if the cost of wiring was a minimum could they be obtained; but now, when we want to stimulate use, we are confronted with the inability of the customer to respond on account of the inadequate facilities in his home.

The rapid growth of our industry has resulted in figures for output, revenue and capitalization which are beyond my ability to grasp mentally. Beyond a certain point a cipher or two more or less makes no impression whatever, and consequently, present-day statistics mean very little if injected into a talk of this character.

Future changes may not be so spectacular as those of the past, but I venture to prophesy that in another 40 years we shall comment, with amazed wonder, on the fact that the average household customer in 1927 used less than 400 kw.-hr. per year, or only about 1 kw.-hr. per day. This situation is a direct challenge to our ability, because we know that a thoroughly electrified household can use at least 40 times this amount. Many customers already utilize energy to this extent.

In this connection, I wish to emphasize the report of your rate committee last year wherein was contained the conclusion that a promotional type of rate was an essential in promoting increased usage in the home. Of course, we all know that any given straight line meter rate can be reasonably correct for only one load factor, and is wrong for all others, but the force of habit, together with the beauty of simplicity, makes us slow in

Guideposts for the Industry

WITH changed conditions, it is only the promotional type of rate which will automatically accord to liberal users the lower prices which will stimulate use.

In another 40 years this industry will comment with amazed wonder on the fact that in 1927 the average household customer used less than 400 kw.-hr. per year. A thoroughly electrified household can use at least 40 times this amount, and many do so.

The advocates of government ownership are conducting a carefully camouflaged operation. Once the government is in the power business, there is no stopping place.

Socialism never builds up anything despite its theories. It waits until an industry attains great success and then it wishes to step in and operate that industry according to its theories, which in the past usually have produced dismal failures.

The effort to see state and federal government embarked in the power business is, unfortunately, not confined to those who seek political preferment thereby, but is backed by many restless reformers who honestly feel that the public would gain if profits were eliminated, forgetting that the hope of reward is the greatest incentive for human endeavor, and that it is stimulation of individual initiative by the prospect of profit which has caused America under private ownership to so far excel all the other countries of the world.

The fundamental basis of regulation will have to change to include the concept of overseeing an equitable division of the gains accruing over and above the results obtained from a scrupulous carrying out of our franchise obligations.

*Excerpts from an address delivered at the annual meeting of the Association of Edison Illuminating Companies, Colorado Springs, Col., Sept. 27, 1927.

abandoning the old form which has served us so well. A straight line meter rate is pre-eminently the one with which to attract new customers to our line, and as such has done splendid service, but now that this part of the job is practically completed, we must make use of the best possible means at hand in order to meet the changed conditions.

Our industry has to a large extent outgrown the day when local politicians could find profit and votes by attacking the company serving his constituents, and therefore, with a few exceptions, our companies find the local relations with their customers to be excellent. This is admirable, but does not mean that our watchfulness and efforts can be relaxed. It means only that the scene has changed. The vastness and phenomenal success of our industry as a whole now make it a natural target for the national politicians, many of whom are hard at work in lines of endeavor which, if successful, would seriously delay progress and be very detrimental both to those who use our product and to those who invest in our securities.

Financial Incentives Led to Service

When an industry becomes great and prosperous and thrives through the service it gives to the public, it becomes subject to the attacks of theorists, visionaries and other radicals. This is illustrated by numerous instances in our industrial history. When the railroads became great, the advocates of government ownership called for their nationalization. Led by such men as United States Senator George W. Norris, they cried that the government could operate the railroads better than could the men who had given their lives and their brains to make them efficient.

Socialism never builds up anything despite its theories. It waits until an industry attains great success, and then it wishes to step in and operate that industry according to its theories, which in the past usually have produced dismal failures.

The effort to see state and federal government embarked in the power business is, unfortunately, not confined to those who seek political preferment thereby, but is backed by many restless reformers, who honestly feel that the public would gain if profits could be eliminated, forgetting that the hope of reward is the greatest known incentive for human endeavor, and that it is stimulation of individual initiative by the prospect of profit which has caused America under private ownership to so far excel all the other countries of the world.

Owing to the widespread feeling of the voters all over the country against government ownership and operation, the advocates of such a course are conducting a carefully camouflaged operation. Boulder Dam, Muscle Shoals, the Columbia River and the St. Lawrence—in none of these is the government entrance to the power business emphasized. Boulder Dam is set forth in its humanitarian garb of flood control, but how much prominence is given to the fact that flood control can be obtained for about $15,000,000, a sum which is barely equal to the single item of interest during construction on the proposed expenditure of $150,000,000? Those who wish to use this as the entering wedge for placing the government in the power business stipulate "Boulder Dam or nothing," and they have as allies those who wish the federal government to spend millions on behalf of a new water supply for Los Angeles.

Once in the power business, there is no stopping place, and it is this which makes the situation of vital and personal interest to each one of us.

In this connection, let me urge on you that it is not only important but is essential that every one of us give our hearty co-operation and assistance to the joint committee of the National Utility Associations, which has undertaken the arduous task of directing the work of placing the true facts pertaining to the situation before not only our representatives in Congress but their constituents as well. The joint committee is giving the public the facts about the utilities and is trying to demonstrate that the entry of the government into this field is politically unwise, economically unsound and competitively unfair. This is being done not wholly from the standpoint of self-interest, but because it is the obligation of every citizen to fight the spread of theories which, if adopted, would subvert the foundation upon which our national progress has been erected.

The utility industry today is thoroughly and essentially American both in its development and in its efficient operation, and its ownership is so widely spread among all of our citizens that the industry should be kept out of politics and away from political ownership or operation.

There is a very plausible sound to the argument that natural resources, such as water power, should not be given into private hands to be developed for profit, because of the fact that very few realize how essential are the brains, labor and capital which must be devoted to its development before it can be of service to mankind.

It is natural for many to advocate the spending of federal funds to develop these resources, which to date have not been developed by private initiative on account of the fact that the time has not yet arrived for them to be self-supporting. Uneconomic developments are no better made with federal than with private funds, but are often thoughtlessly undertaken by those who have the power to spend without the attendant responsibility for economic returns—as witness many reclamation projects which, although made on the promise of self-sustaining prospects, Congress has had and will have to write off either in part or completely.

We are all, therefore, vitally interested in doing our part to maintain our American traditions of protecting and encouraging private initiative under which our nation has prospered to such a wonderful extent.

Rural Service Economies

Much progress has been made in various parts of the country toward meeting the needs of the rural population in the matter of extension of service, and it is a very good sign that this problem is being met not by our industry saying what it will or will not do, but by representatives of both sides getting together and studying how to surmount the problems which are involved.

It is today becoming very generally recognized that it is not enough simply to extend the lines to rural customers. Such a course alone is an economic waste, as the present-day use is not sufficient to support a line of ten or fifteen poles per customer at rates which are self-supporting only when there is a customer density of two or three customers per pole.

What must be done before the problem is solved is to develop uses which are economically sound to an extent which will permit the rural customers to compensate for their scattered location by the great volume of their individual uses. It makes no difference whose

money pays for the cost of a rural line; it is an economic waste unless a sufficient use can be developed to make it self-sustaining. This, once again, means the use of promotional types of rates rather than straight line meter rates. The recognition of this side of the problem is, fortunately, not confined to us, but is gradually being accorded its proper weight by the various rural associations with which we are collaborating. This to a large extent is quieting the senseless demand of a few years ago for line extensions regardless of the economics.

The great increase in the sphere of usefulness of our industry, together with the prevailing differences of opinion as to what profits are in equity due to our investors, raises in my mind one question which is worthy of thoughtful consideration as having a possible bearing on the future. I refer to the present-day view from which regulation is administered. Regulation today is really nothing but the supervision of the carrying out of a "cost-plus" contract; possibly I should say a "value-plus" contract, to conform to current decisions.

Cost-Plus Basis Inadequate

When our business consisted of the independent serving of a specific and limited territory, the "cost-plus" concept might have been held to as a reasonable basis of regulation, although susceptible to the same objections of lack of full incentive and of liability to abuse that is inherent in "cost-plus" contracts the world over. In such limited fields the "cost-plus" contracts can and have been faithfully carried out and reasonably regulated, but we are outgrowing such limited spheres of usefulness. Today where many localities are served or administered by one company and the performance in each franchise territory is greatly bettered by interconnection and common management, should there not be a legitimate reward for such betterment beyond the obligation accepted in the company's franchise, and should there not be inducements held out as rewards for still greater improvements? We have no provision for such inducements and rewards in present-day regulation. A reasonable return on the value of the useful property leaves no reward for the risks taken in going beyond franchise obligations in furtherance of progress and greater opportunities for service. Of course, companies rendering such service can obtain an added compensation by capitalizing the difference between value and cost, but this method appears to the public as shrouded in mystery and would be quite unnecessary if the services rendered and accomplishments attained were generally recognized as being properly entitled to reward. Also the method can only operate due to the fortunate fact that values generally exceed costs and will be inapplicable whenever the two become equal or their relation is reversed. There is no question of the desirability, from the consumer's point of view, of sharing equitably with capital the gains which can be made under the urge of a proper incentive in order that the maximum benefits may be obtained as soon as possible, but today there is no recognition of this fact in the concept under which regulation is carried out.

I am quite aware that many feel that the injection of any thought or word indicative of a partnership with the consuming public is heresy and dangerous, but I cannot but feel that before a complete solution is reached the fundamental basis of regulation will have to change from the present concept of the enforcement of a cost-plus contract to include the concept of overseeing an equitable division of the gains accruing over and above the results obtained from a scrupulous carrying out of our franchise obligations.

Let me cite a single illustration of the present lack of inducement to best performances. Suppose that a company which is faithfully serving its franchise territory finds that instead of building a new power house, it is economically sounder to buy power from a neighboring company and does so. In such a case the stockholders of that company forego entirely the right to supply the capital which would go into the plant and on which they would be entitled to a reasonable return. What do they receive in return for their self-sacrifice in giving up these valuable rights in order that the customers may have the benefits of the minimum cost? Nothing at all; the "cost-plus" concept of regulation recognizes only the reasonable return on the value of the property used, and, therefore, the incentive is removed. There have been many cases in recent years where the thing economically best was rejected solely because of this lack of incentive, and there is also a real danger that in the future uneconomic and non-essential capital expenditures will be made in order to circumvent the "cost-plus" method of operation. How much better that the concept of regulation should gradually change sufficiently to recognize the present difficulty, and to look on the equities of the situation as demanding an equitable division between two essential partners in a business in which there is at present no limit to the possibilities, if only some way be devised to hold out the inducement of sufficient legitimate rewards.

We must recognize human nature for what it is rather than for what we might wish it to be, and however much we may respect the "service motif," we must remember that at the present stage of civilization it has not the same impelling strength toward progress that exists when the hope of reward is dangled before our eyes.

Speeds and Electrical Oscillations Estimated by Musical Pitch

BY MEASURING the pitch of noises attending the operation of machinery it is often possible to make quick and fairly close determinations of speeds or other cyclic phenomena when these lie within the audible frequency range—particularly between 100 and several thousands per second. The method is convenient, since it calls merely for a moderately trained ear and a reference sound of known frequency. For greater refinement use can be made of the usual laboratory methods for comparing pitches.

A practical case may be cited. Some time ago the writer had occasion to determine the bursting speed of a line of small commutators, estimated to lie in the region of 20,000 r.p.m. Direct measurement by tachometer was not feasible. The construction of a geared drive, multiplying the speed in a known ratio from the driving shaft, would have involved undue cost and delay.

By connecting the $8\frac{7}{8}$-in. pulley on the motor shaft and the $\frac{3}{4}$-in. driven shaft by a belt $\frac{3}{16}$ in. thick a ratio of 9 to 1 should result, very closely, provided there were no slip. This latter assumption, however, was clearly not permissible. It was observed that the apparatus gave out a sound of very definite pitch, of a frequency obviously the same as that of the revolutions of the shaft. A comparison with the hum of equipment connected to a

60-cycle line thus afforded a direct measure of the speed in question.

The following table summarizes one set of data and computations:

Motor Speed, R.P.M.	Effective Pulley Ratio	Computed Speed of Driven Shaft, R.P.M.	Speed by Musical Pitch, R.P.M.	Belt Slip Per Cent
2,256	9 to 1	20,300	19,300	5

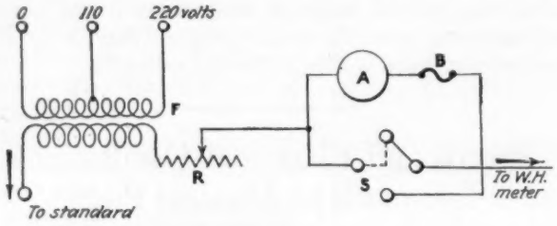
Other applications of the same idea have been made in other fields. For example, a circuit containing inductance and capacity has a definite natural period of oscillation, provided the resistance is not too great. If the condenser is charged by connection to a direct-current source and then discharged through a shunted telephone, there will be a sufficient number of oscillations to be detected as a musical sound, if the frequency lies within the proper range. The duration is very brief, but the pitch is definite.

Since a fair ear can appreciate differences smaller than half a semitone, an accuracy within 2 per cent is readily attainable by very simple means.

Portable Meter Test Kit

By C. J. Fuhrmann
District Superintendent of Electrical Meters, Consumers Power Company, Jackson, Mich.

THE field tester of the average electrical meter department has usually been burdened with a lot of testing equipment that was more than one man could comfortably carry and it made him appear like a pack mule heavily loaded. In order to eliminate this condition the kit illustrated in this article was developed. No provision was made for the standard in this kit, as it was attempted to balance the load as nearly as possible. The standard is to be carried in the other hand of the tester. The equipment installed in the kit is the lightest in weight that could possibly be bought.

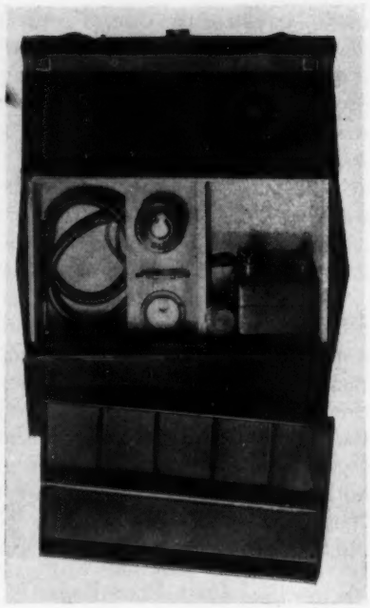


A-Ammeter, 3 amp. full scale
B-Fuse, 1½ amp. instrument fuse
F-Phantom load, 110 and 220 volts range, 60 amp. maximum secondary current
R-Compression carbon rheostat
S-Snap switch, 30 amp., 2 heat

CONNECTION DIAGRAMS OF METER TEST KIT

The phantom load has a double voltage range and 60 amp. capacity. Its case is of aluminum and its weight is very light in comparison with its capacity. The rheostat is an uncalibrated carbon compression rheostat and is an integral part of the loading transformer.

On account of the rheostat being uncalibrated it was found difficult to maintain the proper light-load current, and this resulted in inconsistent checks. This was overcome by introducing into the secondary circuit a 3-amp. full-scale ammeter protected by a 1½-amp. fuse and provided with a switch by means of which the instrument could be shunted and disconnected when it was necessary to use current values beyond its full-scale rating.



METER TEST KIT OPEN

This is accomplished by snapping the switch to the low position, as indicated on the switch shell, when using current values below 3 amp. and to the high position when the current values exceed 3 amp. This switch also has an added advantage in that it can be used to check a meter for creeping without disturbing the rheostat setting or disconnecting any terminal connections, simply by snapping the switch to either off position and thereby leaving the potential coil in an energized condition.

It is impossible to overload the current coils of the rotating standard due to the low secondary voltage of the loading transformer and the impedance of the current coils. The power factor of the transformer is, however, very good for all current values.

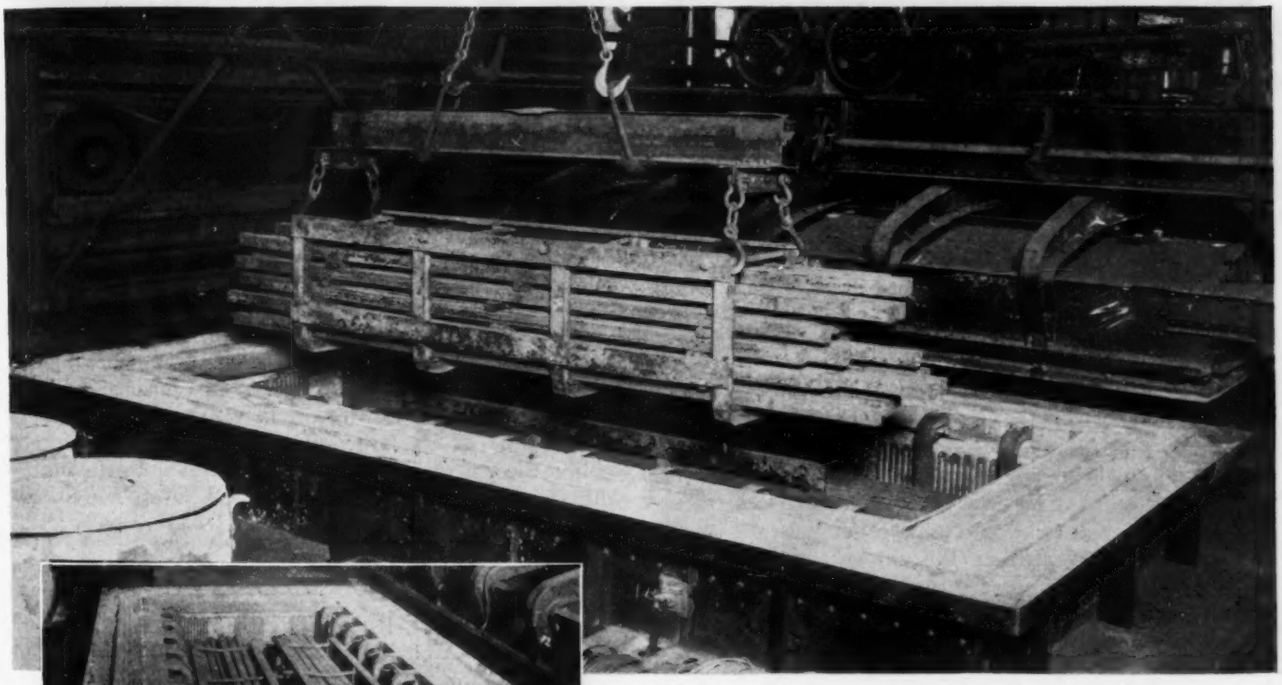
The first picture illustrates the kit and the various elements incorporated in it. It is lined with wood in order to prevent any of the equipment becoming grounded to the kit, which is of steel. There is also a removable tray partitioned so that tools, jewels, pivots, etc., can be carried readily and kept in order. All leads are carried in the compartment below the tray. On account of the peaked shape of the cover there is room for a pair of rubber gloves and leather gauntlets above the tray, if they are required. The outside dimensions are 16 in. long, 7 in. deep and 9 in. wide. The second picture shows the kit when it is closed. It is of such shape that it is easily carried. Its chief advantage, however, is that it includes all of the testing equipment except the rotating standard. The connections are shown in the drawing. This kit has been in use in the electric meter department of the Consumers Power Company at Jackson, Mich., for the past six months for single-phase testing and has proved very satisfactory.

METER TEST KIT CLOSED

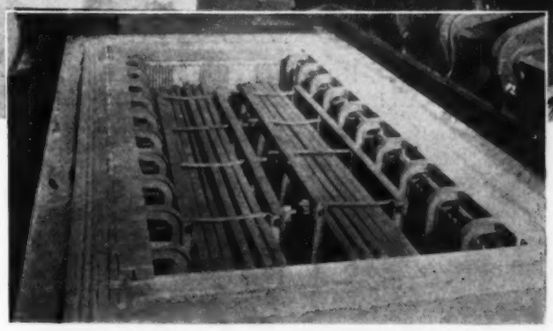
Electric Annealing

Solves Machining Problem at Timken Plant

Exacting requirements in heat-treating high-carbon, high-chromium steel. 850-kw. pit type electric furnace anneals 84-ton charge of steel bars



HANDLING 10-TON CRADLE OF 3-IN. STEEL BARS



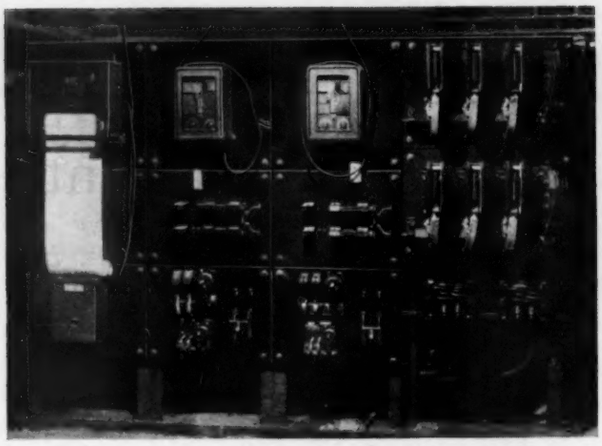
CHARGE OF BARS IN FURNACE

ONE of the most difficult problems with which steel makers have had to contend is the treatment of high-carbon, high-chromium steel requiring very careful annealing to develop the machining qualities needed for automatic machinery. This type of steel has usually been treated by subjecting it to a long-time annealing cycle, paying particular attention to a very slow rate of cooling to a point at least well below the critical range. Such annealing cycles often required four or five days.

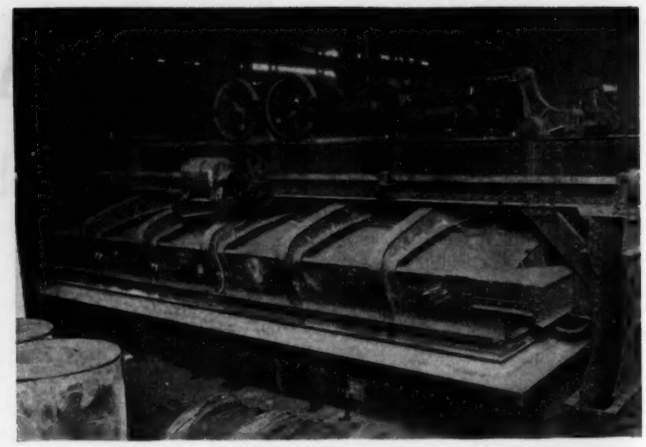
A great deal of this kind of steel is used by the Timken Roller Bearing Company in the manufacture of its product, and with the addition of a large amount of new melting capacity in electric arc furnaces the company is able to supply a considerable tonnage of commercial alloy steels for automotive and other bearing manufacturers.

To meet the exacting requirements in heat-treating this kind of steel the Timken company uses electric furnaces to anneal steel bars, tubing and wire. The most recent installation is that of an electric furnace, rated at 850 kw. and having a capacity for annealing 80 tons of steel bars at one charge. The furnace and auxiliary apparatus, which was built by the Electric Furnace Company of Salem, Ohio, is of the pit type, with an inside width of 9 ft., a length of 21 ft. and depth from bottom piers to parting line of 6 ft. 6 in. The furnace uses the T-grid type of cast resistance units of nickel-chromium alloy.

In the annealing of the high-carbon, high-chromium steel that is made by the Timken company it is important not only to subject the steel to the proper temperature cycle but to maintain a furnace atmosphere that will not decarburize the surface of the steel. Such decarburizing makes necessary an expensive machining operation to remove the softened outer layer, which usually means a prohibitive expense. The use of a pit type furnace was decided upon because of the ease with which the infiltration of air can be prevented, which is not easy where there is a considerable stack effect. In the pit type furnace the opening is all on one level and thus no stack



SWITCHBOARD AND CONTROL ROOM FOR 850-KW. FURNACE



GANTRY CRANE RAISING FURNACE COVER PRIOR TO REMOVING IT

effect is produced. This furnace has a double sand seal at the top of the wall which forms the parting line between cover and furnace. As an additional precaution, all seams in the structural steel shell were electrically welded and all terminal and thermocouple openings were carefully packed to exclude air.

An idea of the size of the furnace may be gained from the fact that the cover weighs more than 25 tons. This cover has a firebrick arch with a 9-ft. span and is framed with heavy I-beam girders held together by cast-steel roof clamps.

A special 25-ton gantry type traveling crane was built to handle this cover, the crane running on rails at floor level. It was originally intended to build the cover-handling mechanism as a part of the cover itself, but this plan was discarded because additional furnaces, if installed in the future, would require duplication of the cover mechanism, whereas the single gantry crane is arranged to serve five or six furnaces located in line.

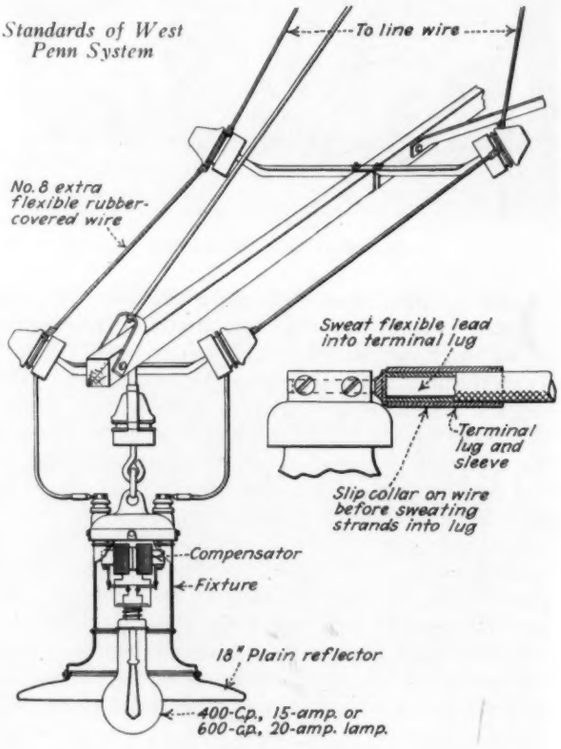
The loading space inside the furnace is 7 ft. wide by 19 ft. long and 6 ft. deep. The charges rest on firebrick piers with nickel-chromium alloy caps closely spaced in the furnace bottom. Heating elements are located beneath the charge and on both sides and end walls. Guard rails of nickel-chromium alloy extending from the top of the side walls down to the pier caps protect heating elements from damage from careless handling of material.

The heating elements are connected in two three-phase zones of 425 kw. each separately controlled. During the heating-up period these two zones furnish approximately the same rate of power input, but during the soaking period the bottom zone furnishes nearly all the required heat.

In operation a charge is heated to the annealing temperature as rapidly as possible and soaked at this temperature for a period of hours depending upon the analysis of the steel. The charge is then permitted to cool slowly to approximately 1,200 deg. F., after which any desired rate of cooling is allowable until the temperature is reduced to a point that permits handling. In order to increase the speed of cooling during this period and thus increase the furnace capacity, a system of return flow cooling pipes located along the side walls is used. When it is desired to cool rapidly, air is blown through these pipes by two motor-driven centrifugal fans, the heated air being discharged through two exhaust vents. The furnace is used primarily for annealing tubes and square or round bars. However, it is also possible to anneal coiled wire, although the latter does not load as heavily as the tube or bar stock. The furnace readily accommodates a charge of 60,000 lb. of tube and upward of 80,000 lb. of bar stock. Depending on the class of material handled, its annealing capacity is from 300 to 500 tons per month.

Results from the standpoint of physical properties of the annealed material are entirely satisfactory, particularly in the uniformity of steel, and in addition to this the work comes out with little or no scale and with no injurious decarburization. The power consumption per ton of material annealed is of course somewhat higher than would be obtained in the same furnace without cooling the charge. However, the furnace is extremely efficient due to its large size, and even with furnace cooling the power consumption compares quite favorably with smaller units operating under less severe conditions.

Compensator Type Street-Lighting Fixture


Standards of West Penn System
To line wire
No. 8 extra flexible rubber-covered wire
Sweat flexible lead into terminal lug
Terminal lug and sleeve
Slip collar on wire before sweating strands into lug
Compensator
Fixture
18" Plain reflector
400-Cp., 15-amp. or 600-cp., 20-amp. lamp.

Organization for Construction

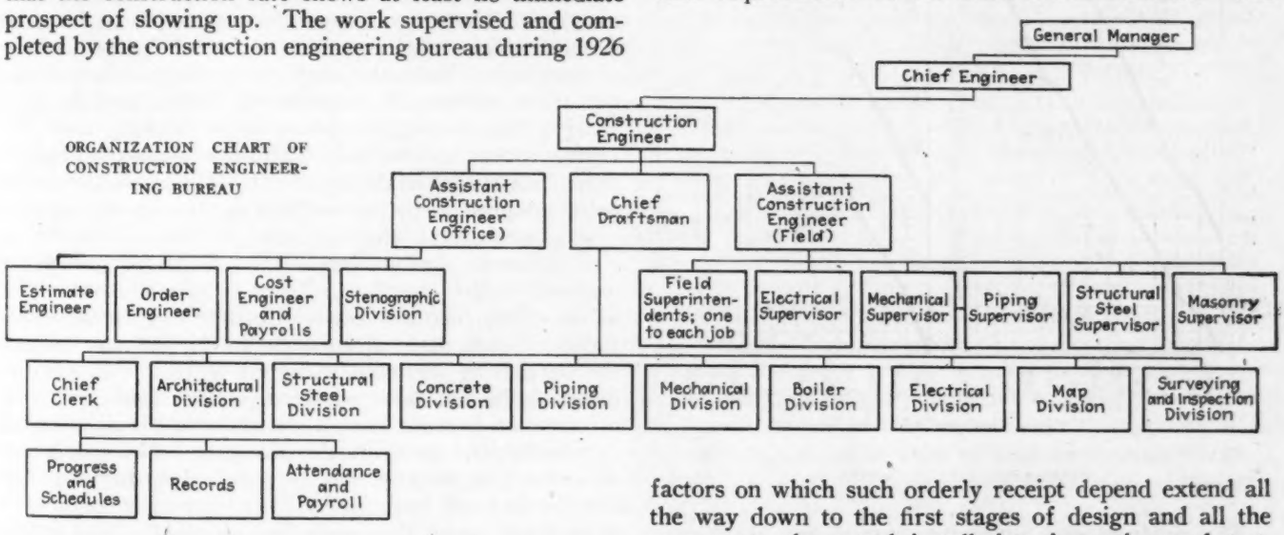
Detroit set-up makes construction an integral function. Executive and engineering decisions on design essential. Necessity for co-ordination of material and equipment deliveries with construction progress

By A. S. DOUGLASS

Construction Engineer Detroit Edison Company, Detroit, Mich.

DURING the past two years the Detroit Edison Company has had a very active construction program covering power plant, substations, a heating plant and a gas plant, not to mention additions and improvements to the transmission system. With work now started on a new power house on the same site with the present Delray plant of the company, it is evident that the construction rate shows at least no immediate prospect of slowing up. The work supervised and completed by the construction engineering bureau during 1926 amounted to approximately $21,000,000. All of the power house, substation and building construction is done by this department; only jobs of a special type are sublet to outside contractors. In consideration of the magnitude of the work handled by the construction bureau and of the continuing importance of that bureau in the organization of the company, it is felt that a description of the manner of its functioning and of the relationship of its parts, one to another, may be of interest and perhaps of value to other utility companies during their own construction work.

ORGANIZATION CHART OF CONSTRUCTION ENGINEERING BUREAU



All major orders originate with the chief engineer of the company for power plant development and with the superintendent of the electrical system for substation developments. The approved construction budget is furnished to the construction bureau by the general manager's office. On receipt of an order to do work, design conferences are called by the construction engineer, with all departments that are interested represented. At the conferences the engineering layouts are determined and approved, also the type and location of the equipment decided upon, so that the work of detail drafting may proceed. All drafting and surveying are conducted by the drafting and surveying bureau, the chief draftsman in charge of this bureau reporting to the construction engineer. In carrying out any construction project the design decisions are the first consideration.

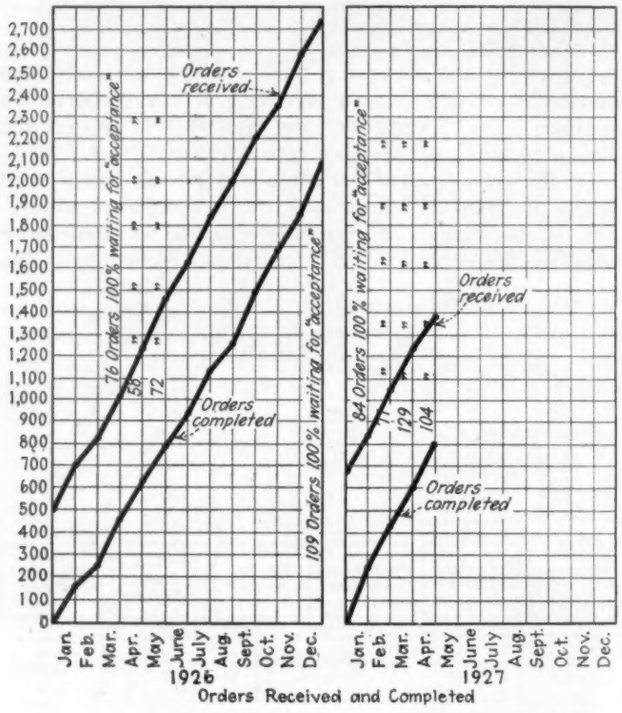
In the development of a modern power house or a year's program of substations, the most vital consideration is the matter of receiving material in accordance with requirements of the construction schedule. The factors on which such orderly receipt depend extend all the way down to the first stages of design and all the way up to the actual installation, inspection and test. No step can be taken in the procurement or delivery of any piece of equipment until the engineering design from the chief engineer, as to the nature or make of this equipment, is secured.

Very little progress can be made in the selection of building material or producing building drawings until all essential decisions regarding arrangement and selection of equipment are in the hands of the drafting bureau. This situation necessitates careful attention to the time element of design in order to co-ordinate required delivery periods with the required construction program. For this reason the greatest possible stress is placed on early design decisions and the routine of procurement and follow-up. Little can be done in meeting a construction program if progress is hindered by lack of material. Accordingly careful detailed records of all progress in matters of design, selection of equipment and decisions wanted for the construction program are kept and published for the information of contributory parties. These records are referred to specifically later.

The drafting and surveying bureau is composed of the chief draftsman, chief clerk and a clerical division, to handle progress records and schedule work. It includes the

following major divisions of drafting activity: Architectural division, structural steel division, reinforced concrete division, piping division, mechanical division, boiler division and electrical division.

The first three handle all building engineering work. The mechanical division handles all mechanical problems not pertaining to piping or boiler design. The boiler division is maintained on boiler engineering to give this subject more careful and intimate attention and to reduce the otherwise over-large amount of work of the mechanical division. The work of the drafting bureau applies equally in accordance with the hitherto indicated functions on substations, power houses and miscellaneous construction, such as warehouses, office buildings and the like.



GRAPH SHOWING RELATION OF WORK IN PROGRESS TO WORK COMPLETED AIDS PLANNING

The drafting and surveying bureau also includes a map division, which maintains all records of lines, overhead and underground, property surveys and the like. There is also a surveying and inspection division, which furnishes all surveys for the above, and maintains a corps of inspectors to inspect the quality of work performed by the construction bureau. This does not include acceptance inspection of material or equipment; this inspection is conducted by a division of the purchasing department.

Planning of Field Work

With the design and major equipment decided upon, the next important factor is the planning of the field work. The procedure is to work out the following program schedules:

A. Field Progress Schedule.—This schedule is arranged to show the starting and completing date for each division of the job; for example, a power house will be subdivided something as follows: screen house, switch house, coal-unloading house, boiler house, turbine house, etc. Under each of these main headings there would be shown the starting and completion date for the form work, reinforcing and concrete work for substructure, steel work, brick and stone work, steel sash, roofing, etc., following up with the schedule of all equipment that is to go into each building.

B. Drafting Schedule.—From Schedule A a drafting schedule is made for each division of the drafting organization—namely, architectural, boiler, concrete, electrical, mechanical, piping and steel. The schedule division works up a detail schedule for each major item for each of these divisions arranged to co-ordinate the work so as to have the drawings and bills of material completed in the order the field will require them for construction, as any delay in one group may offset the progress of another and at the same time delay construction progress. The engineers of divisions follow these schedules to line up their drafting work so as to meet the dates required. In working up these schedules, consideration is given to special materials, inasmuch as schedules are so arranged as to have materials on the job as they may be required. As the bills of material and drawings are completed they pass through the schedule division to inform this division fully as to what has been accomplished, also to show on each bill of material the date materials are required in the field.

All bills of material and drawings are recorded and sent to the estimating division, where the work order is assigned. They are then sent to the order engineering division, where the requisition is issued for purchasing of materials. The order engineering division is the contact point between the construction bureau and the purchasing department, also between the drafting and surveying bureau and the field. The follow-up and disposition of materials are also handled by this division, a group being assigned to the several classes of material such as piping, mechanical, electrical, etc.

C. Material Status Report.—As a job progresses, a material status report, as shown in the illustration, is made. This report is kept up to date to give the exact status of each piece of equipment. If, for any reason, the purchasing department finds it is unable to get the materials by the date requested on the requisition, this information is made known and the schedule is changed or substitutions are made, depending on field construction progress. As the materials are received in the field they are checked off from each bill of materials, tagged to show their usage, then stored or installed. This information is furnished the follow-up division to keep its records up-to-date.

Field Conferences

As a major field job progresses the construction engineer calls field conferences, which include the engineers, the material men, the field superintendent and foremen and a representative of the purchasing department. At these meetings the job is analyzed from the design, material and construction view, to give each an idea of the exact progress made, also a check to see if the job is on schedule. These meetings give the office and field men a good opportunity to straighten out any differences or irregularities that may appear.

During 1926 the construction engineering bureau received 2,217 orders, which covered work from a repair job to a major construction job, such as a power house. The curve sheet here reproduced shows orders received and completed, the top line orders received, the bottom line orders completed. The notation "waiting for acceptance" means that these orders have been completed and that the construction bureau is waiting on an acceptance report from the department requesting the work. This

Sheet No. 3.

May 1, 1927

POWER PLANTS

C.E.D. No.	Office Order No.	Plant	Description	DRAFTING ROOM Date Wanted	Classification	Scheduled for Completion	Percentage Complete	FIELD Material	Scheduled for Completion	Percentage Complete	Supt.
4964	4964 (6894)	Connors Creek	Replace six machine panels				100	On hand	6-5-27	60	Mc Partlin
4543	4543 (6347)	Connors Creek	Four motor-driven boiler feed pumps		A		100	Testing controls Bal. on hand		50 75	Dickson Mc Partlin
2205	2205 (6823)	Connors Creek	Air Cooler, Unit No. 4	When Avail.	A		100			100	Dickson
621	621 (8295)	Connors Creek	Direct-connected exciters, No. 1 to 5				100			100	Mc Partlin
10961	10961	Delray	Build brick telephone booth on turbine room floor near No. 10 gen.		B		20			0	Dickinson
10230	10230 (1697)	Delray	Extend temperature leads and install terminals block on side of No. 3 condenser		B		100			100	Mc Partlin

REPORT ON OPEN CONSTRUCTION ORDERS PERIODICALLY CIRCULATED

acceptance report indicates that the job has been completed to the satisfaction of that department. On receipt of this report the work is ordered closed.

The gap between these two lines gives the construction engineer a good indication of how the present force is keeping up with the amount of new work ahead and is a good barometer to control his organization. All work is covered by a carefully planned and supervised cost system for the benefit of estimators and for executive control.

There is also illustrated part of a tabulation from a pamphlet issued each month listing all open construction orders, showing the order number, description of job, date wanted, the classification and percentage of progress for the drafting and field work, also the superintendent in charge of each job. On this record Classification "A" means orders of sufficient importance to take priority over other jobs and to be given special follow-up for completion; Classification "B" means orders of sufficient importance to warrant extra follow-up and to be completed as early as possible; Classification "C" means orders that warrant continual follow-up but not of sufficient importance to interfere with class "A" or "B" jobs.

This pamphlet, better known as the "newspaper," is distributed to all departments that have issued construction orders, also to departments that may be interested from any other angle, inasmuch as it gives a good picture of the amount of construction work on hand and the progress being made, in both the drafting and the field organization. This publication also affords to interested departments information from which they may take up with the construction engineer any matter in which the indicated progress promises to be unsatisfactory.

While the routine system here outlined is designed to accomplish as much as possible for the benefit of the field force, it is by no means relied upon as the full effort necessary to gather together and erect the materials involved in a large construction program. Each major development has its complete field construction organization, reduced in size by the activities conducted at the central office, but nevertheless charged with the full responsibility of watching schedules and initiating pressure where the schedules do not meet field requirements. The smaller jobs are assigned geographically in small groups to superintendents for each group. The relation of the superintendent to the headquarters organization is understood to be that the order engineer's office and the drafting and surveying bureau are agencies working for him to procure and deliver materials and to produce drawings that are essential to his undertaking and at the time required by him. Superintendents have full liberty to deal directly with the chief draftsman or the order engineer, or in the event of failure to get satisfaction by such a contact, to call on the construction engineer or his assistants.

In addition to the superintendents directly responsible for jobs, there is, reporting directly to the construction engineer, a staff of specialists in field work consisting of the following: Superintendent of the electrical division (in technical charge of all installation and erection), superintendent of masonry, superintendent of steel erection, superintendent of mechanical division, superintendent of piping (the superintendent of piping reports to the superintendent of mechanical erection, but conducts a separate division for piping work).

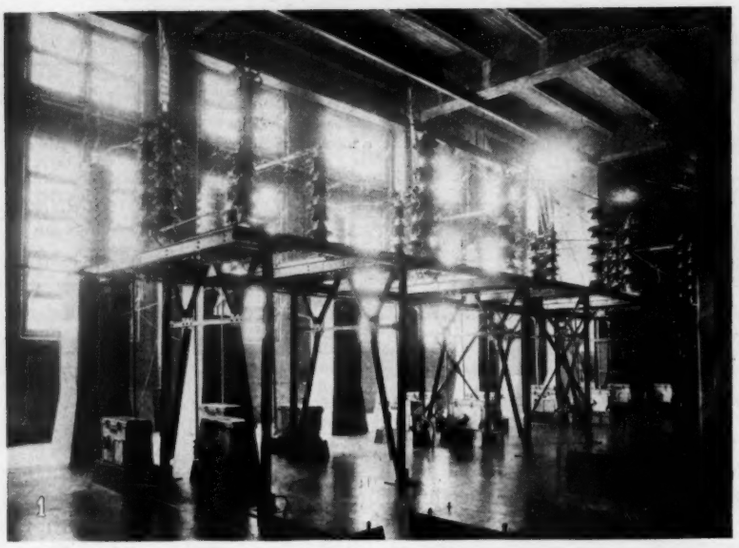
The bureau also conducts an equipment division, which supervises the construction equipment and tools, conducts repair shops and is technically in charge of tool rooms at all developments. The head of this activity also reports to the superintendent of mechanical erection. The authority of these specialists is not superior but contributory to the authority of the job superintendent. Thoroughly competent specialists eliminate the necessity of organizing each job with as high-grade men in the several lines as would otherwise be necessary.

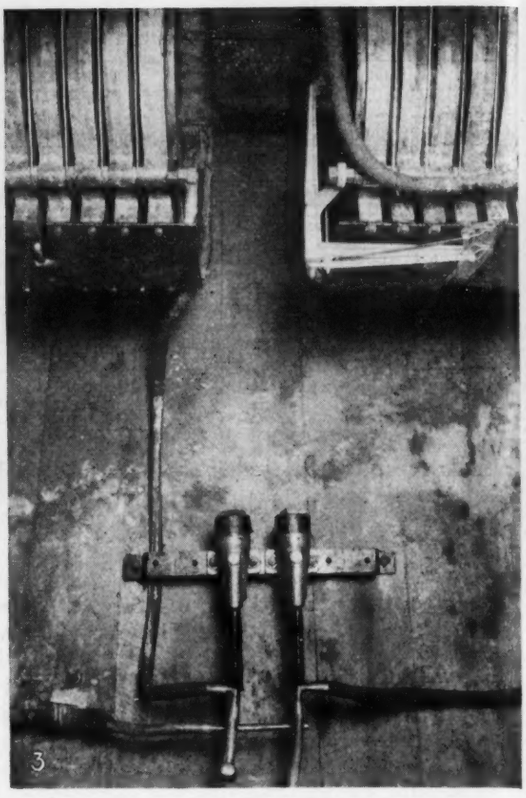
MATERIAL STATUS REPORT

PLANT BEACON HEATING — Dates in Small figures must be met in order to Complete Job as Scheduled — EQUIPMENT FOR BOILER NO. 5

ITEM	NO.	EQUIPMENT	B.M.WRITTEN	B. M. NO.	P.O. NO.	VENDOR	ORDERED	DELIVERY	ERECTION	REMARKS
1	1	Boiler	1-28-27	132B6-G2	57360	Connelly Blr. Co.	2-18-27	3-1 TO 3-15-27 4-15-27	3-15-27 TO 7-15-27	2 Drums to be Shipped 4-13-27
2	4	Water Columns	10-6-26	132B6-F135	55072	Wright Austin Co.	2-4-27	6-1-27 4-15-27	7-1-27 TO 8-15-27	
3	12	Boiler Safety Valves	10-5-26	132B6-F143	Req. No. 57135			6-1-27	6-15-27 TO 7-15-27	Quotation Received 3-4-27
4		Boiler Doors	10-27-26	132B6-F97 to 103	Shop Order 45870-45971	Beecher Shop	11-10-26	6-1-27 4-15-27	6-15-27 TO 7-15-27	
5		Coal bunker	11-22-26			M.L. Miller	11-25-26	3-1-27 On Hand 3-1-27	3-15-27 TO 4-15-27	
6	8	Coal Valves	10-26-26	132C6-F20-24	Shop Order 45969	Beecher Shop	11-10-26	3-1-27 4-15-27	6-1-27 TO 7-30-27	
7	8	Coal Spreaders	7-7-26	132C6-F9	19499	Whitehead & Kales	7-9-26	On Hand 7-1-26	6-1-27 TO 7-30-27	At Delray Warehouse
8	2	Stokers	8-25-26	132S15-F43	Req. No. 279461			4-1-27	4-15-27 TO 7-30-27	
9		Ash hopper	10-21-26	132H5-F30 to 41		M. L. Miller	12-21-26	5-1-27 4-15-27	5-15-27 TO 7-30-27	

FORM IN WHICH STATUS OF EQUIPMENT AND MATERIAL PROCUREMENTS IS SHOWN





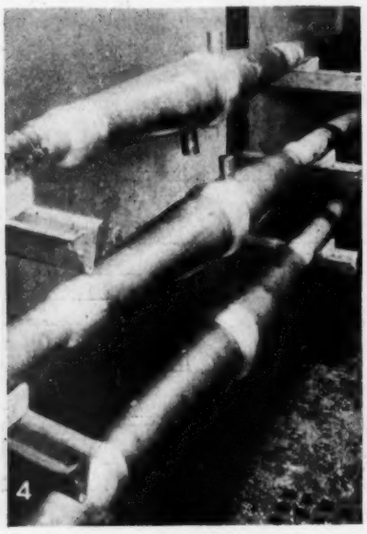
Interesting Features of New York's 132-Kv. Cable Installation

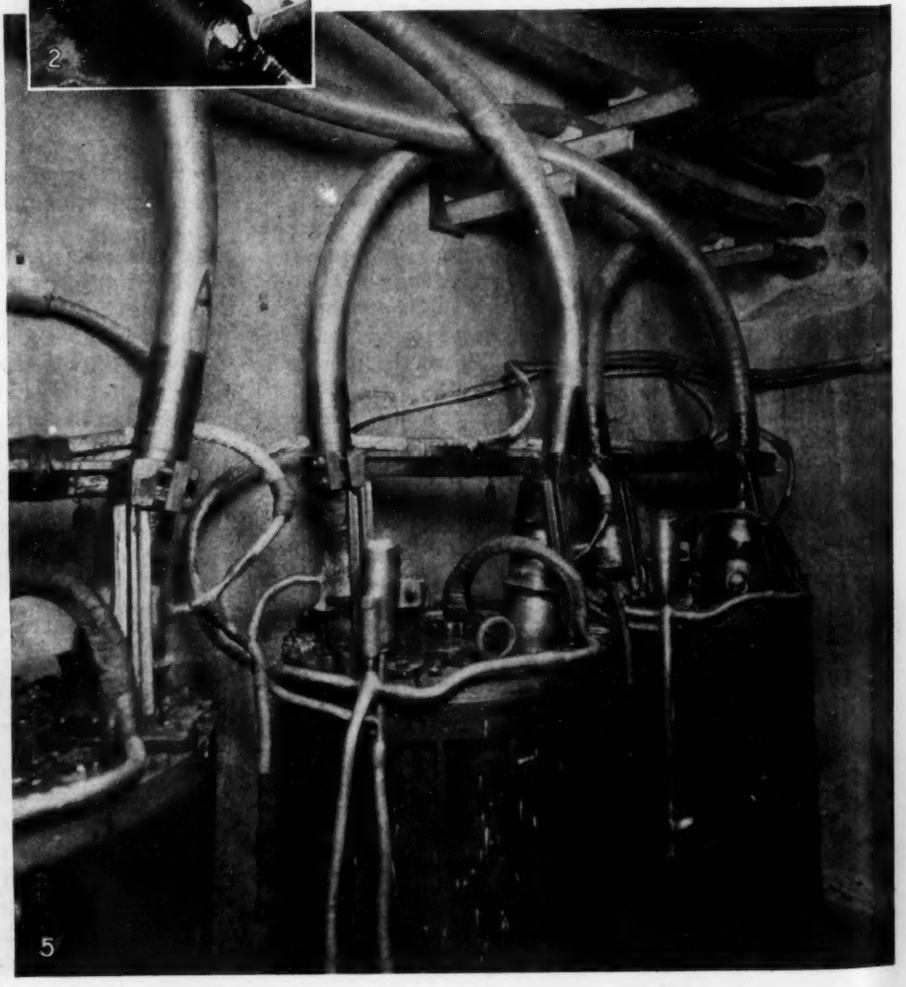
1. Remote-controlled interlocked disconnect and grounding switches for 132,000-volt cables in kenotron testing room at Hell Gate.

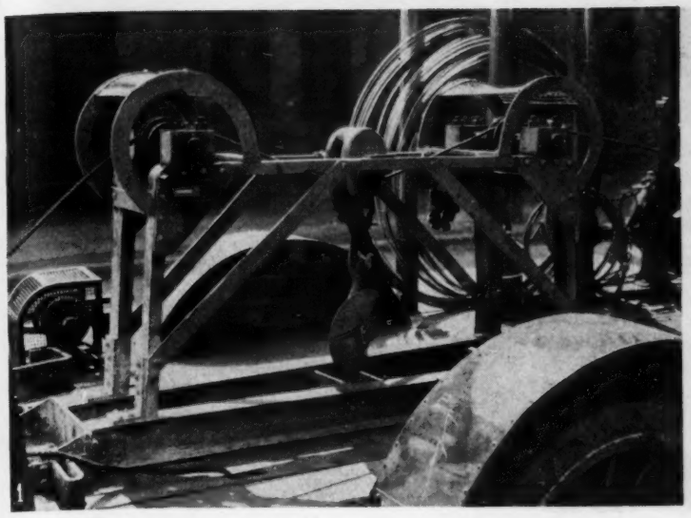
2 and 4. Pirelli and General Electric 132,000-volt cable joints.

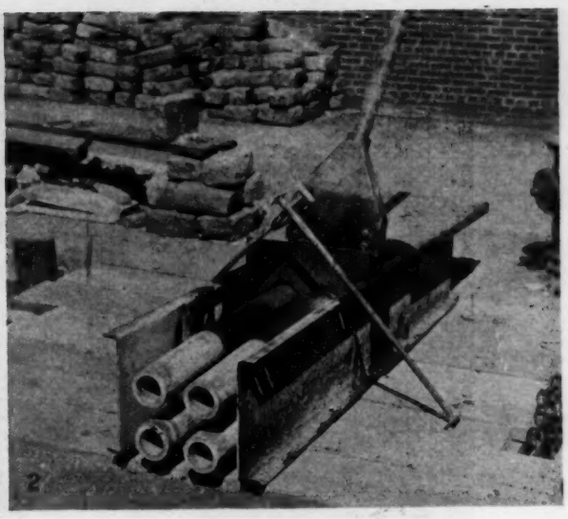
3. Portions of one installation of elevated oil reservoirs installed near cable run and connected thereto by small oil pipes shown. Apparatus on bottom of right-hand tank actuates oil-level indicator at central observation point.

5. Oil-barrier joints for 132,000-volt cable placed about every mile. Small piping is connected with elevated oil reservoirs that maintain head on oil in cable and joints.









Duct Construction and Cable-Pulling Dynamometer

1. Dynamometer on end of cable-pulling truck.

2. Form for constructing 132-kv. duct run.

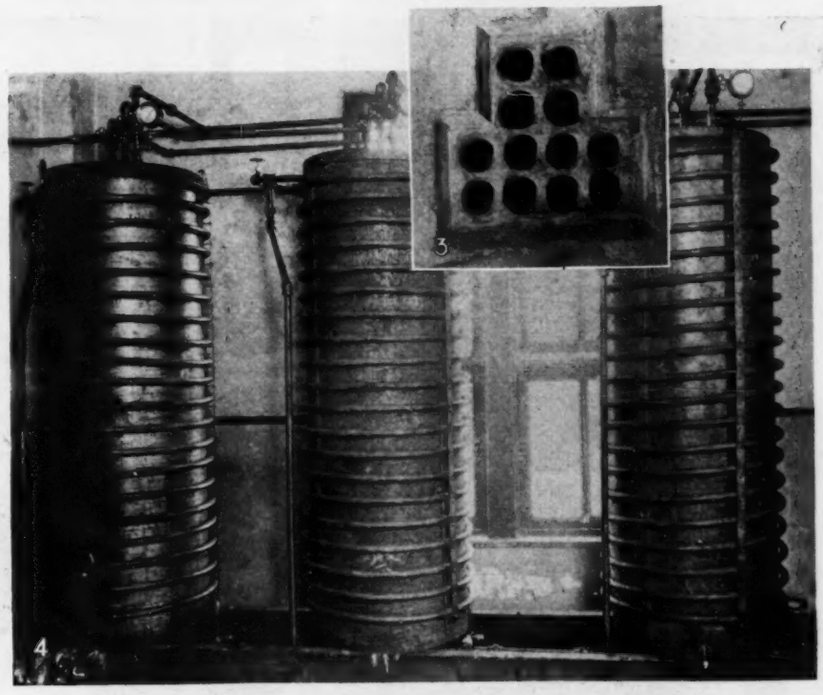
3. End of twelve-duct conduit run for 132-kv. cable.

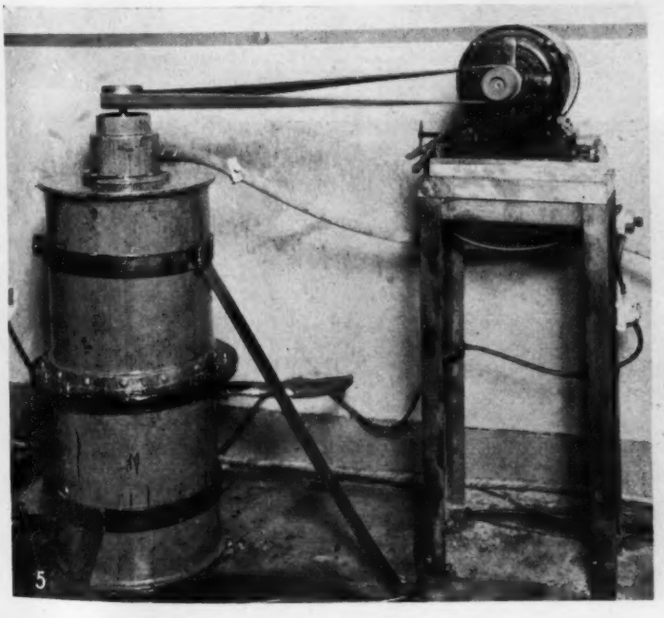
All oil used for filling the cables and joints is previously dried and degasified with the apparatus shown in illustrations 4, 5 and 6.

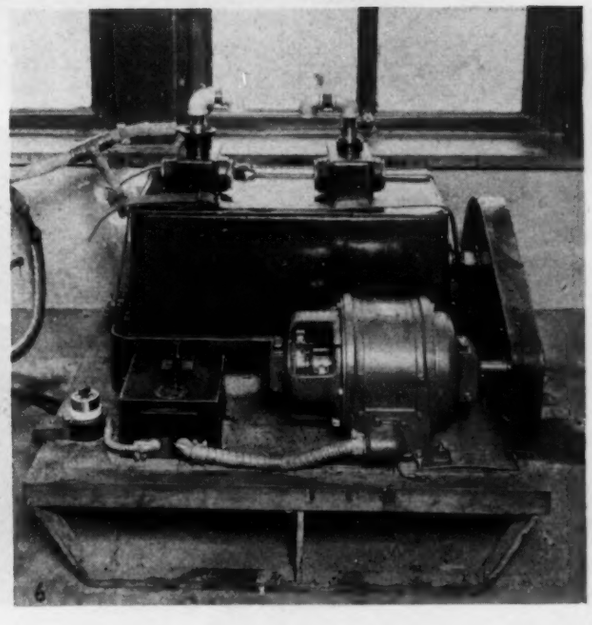
4. Steam coils surrounding the drums heat the oil and aid the removal of gas and moisture. Heat insulation covers these pipes in actual installation.

5. Degasifying apparatus connected with vacuum pump and oil-heating drums.

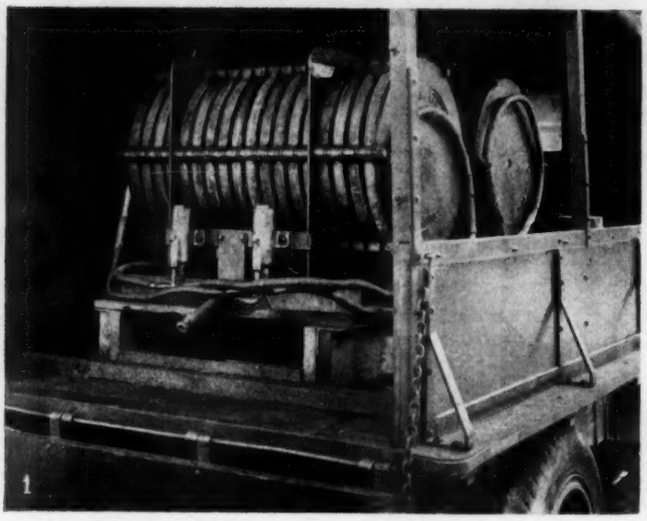
6. One of the vacuum pumps employed.

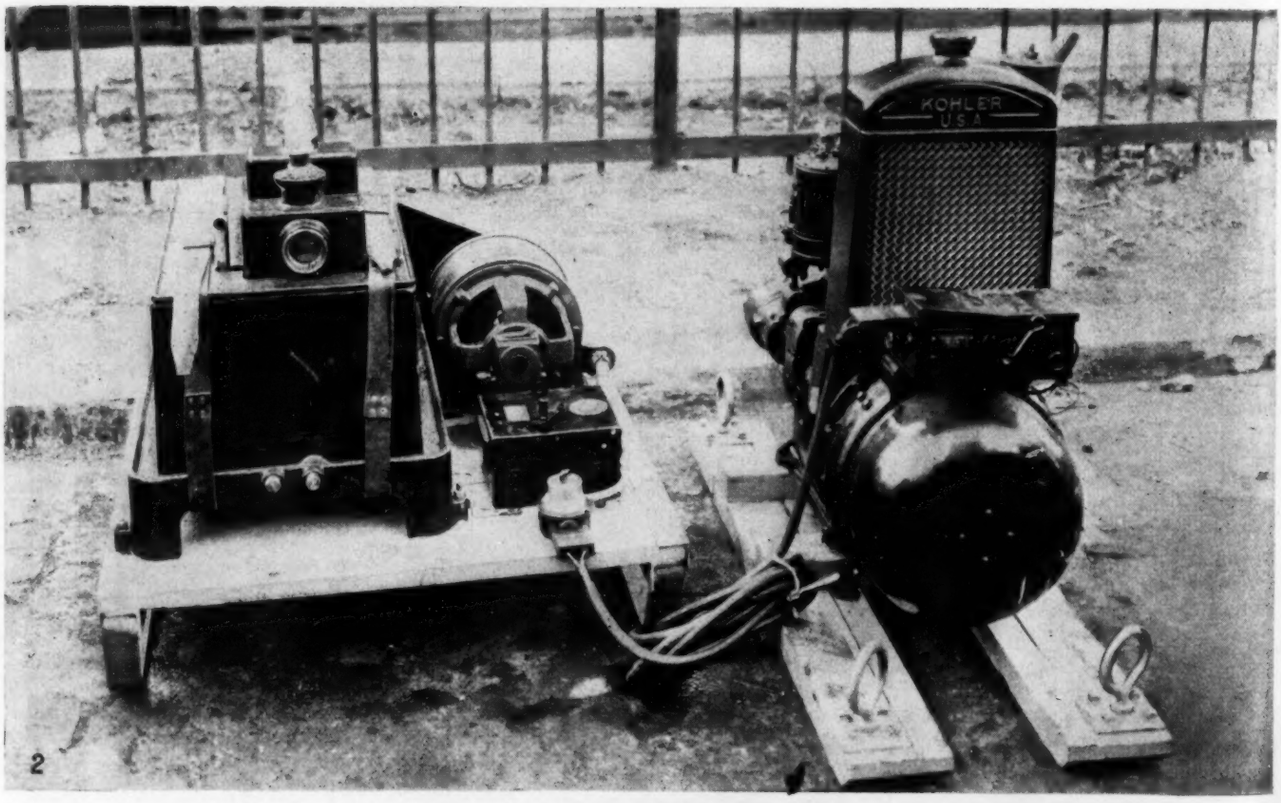






Great Care Exercised in Treating and Transferring Cable Oil



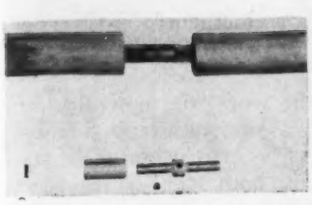


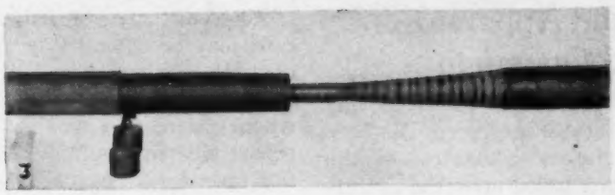
1. Drums in which treated oil is conveyed into the field for filling cables and joints.

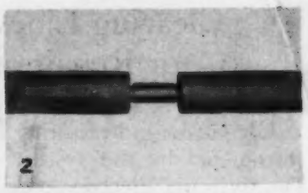
2. A portable vacuum pump driven by a gasoline engine was used to evacuate cables and joints prior to filling with oil.

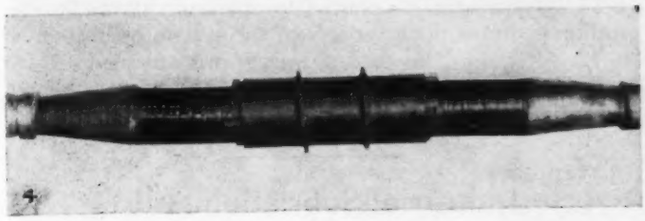
3. Apparatus used in evacuating and oil-filling cable run, straightaway cable joint and oil-barrier cable joint respectively.

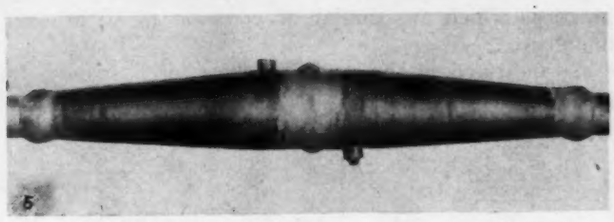
Apparatus for assuring condition of oil before delivery into field is shown in illustrations 4, 5 and 6, on page 735.











Steps in Process of Making 132-Kv. Cable Joints

(By General Electric and Pirelli Methods)

General Electric Process

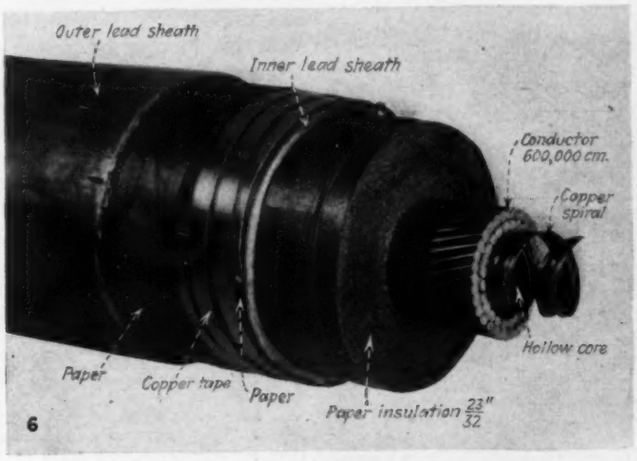
1. Lead sheath and insulation of abutting cable ends have been removed.

2. Hollow connector shown at bottom of 1 has been applied to abutting conductors.

3. Insulation on one cable has been stepped back and treated cotton yarn applied.

4. Insulation has been built up and spacing cylinder slipped over joint.

5. Copper casing applied and wiped to lead sheath. Plugs to permit evacuating and oil filling cables and joints are shown.



Structure of hollow-core oil-filled 132-kv. cable.

Pirelli Process

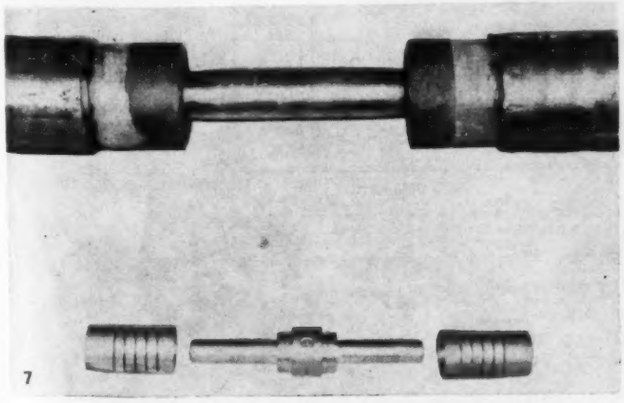
7. Hollow copper connector made up of parts shown below has been inserted between abutting conductors.

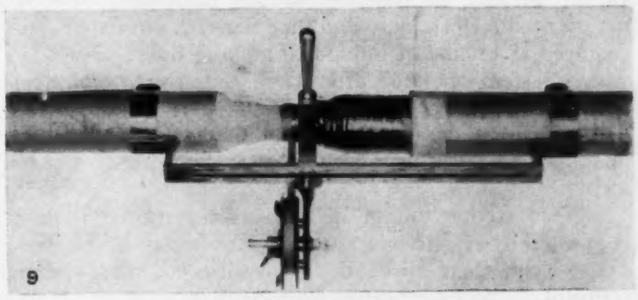
8. Insulation has been penciled down and silk tape applied.

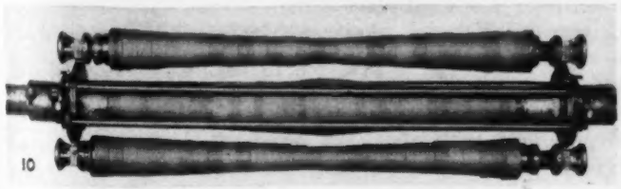
9. Paper tape being applied to joint with hand-winding machine.

10. Completion of application of paper insulation with winding machine.

11. One of the aluminum corona shields applied to joint after insulating.



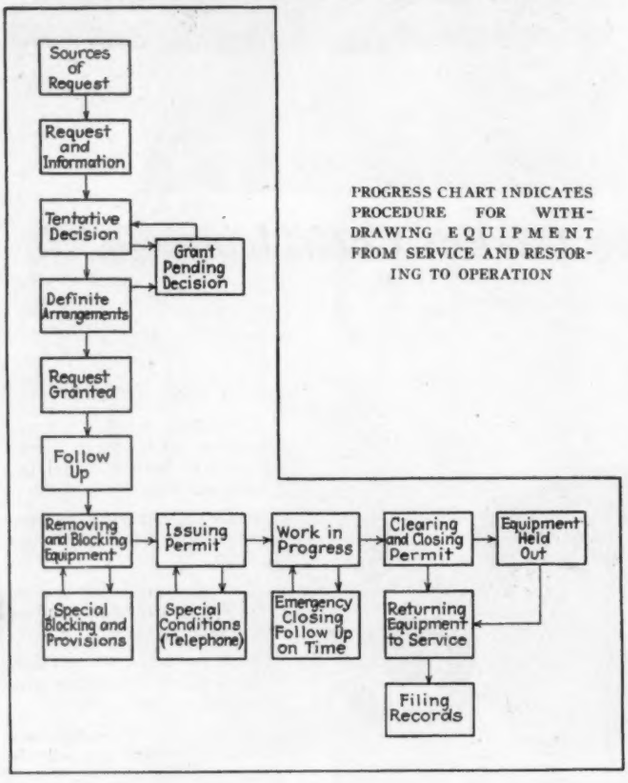




Clearing Lines and Apparatus for Repair and Operation

AN ANALYSIS of the procedure for removing blocking and restoring to service equipment has been formulated by the system operators' committee of the Pennsylvania Electric Association based upon the operating practices of a number of local companies. Many practices which are similar or common to all are outlined here.

As indicated in the progress chart, each request for



PROGRESS CHART INDICATES PROCEDURE FOR WITHDRAWING EQUIPMENT FROM SERVICE AND RESTORING TO OPERATION

the use of lines or apparatus must follow a definite routine, otherwise the efficiency of the entire plan would be impaired.

1.—Anyone who is eligible to work on the equipment desired may enter a request for it. Eligibility lists vary with the individual companies, due to the nature of organization structures.

2.—Requests are placed with the system operator as far in advance as possible, stating equipment desired, nature of the work, date and time desired, estimated time required and name of individual making the request.

3.—System operator after reviewing conditions gives tentative decision.

4.—Definite arrangements are made by the system operator, co-operating where necessary with other departments.

5.—On completion of definite arrangements, request is granted by system operator and date and time assigned.

6.—Request is filed in the records of the system operator.

7.—Switching, placing of grounds and attaching of tags are done by the station operator under direction of the system operator.

8.—Permission is then given to proceed with the work and a record made on a separate permit form or on the tags attached to the blocking.

9.—Work may be halted for emergencies. Overrun time may be extended or job ordered cleared as soon as possible.

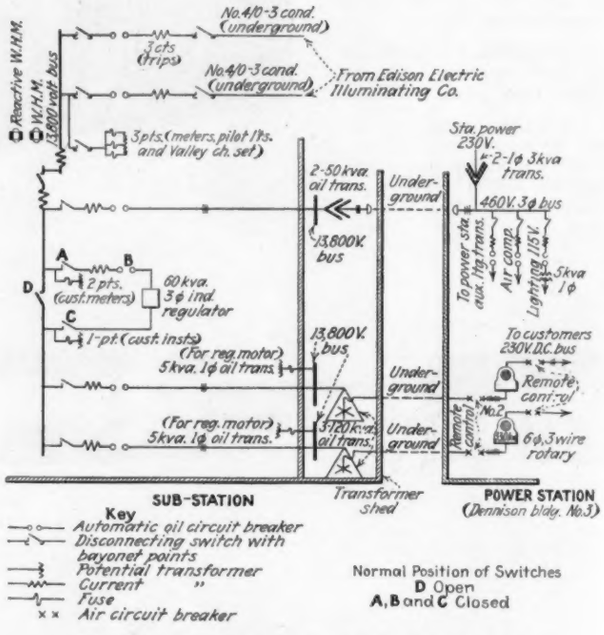
10.—Upon completion of the work, the individual to whom permission was given, as in paragraph 8, must report cleared conditions to the system operator or station operator or, in some cases, to both. This is recorded, with the time, on the permit form.

11.—Apparatus is restored to operating status by the station operator under orders of the system operator.

12.—Requests, tag and permit forms are filed. Records are preserved from a few weeks to two years, according to company policy.

Industrial Substation Aids Heat Balance

CONJUNCTIONAL service by the Edison Electric Illuminating Company of Boston and the power plant of the Dennison Manufacturing Company of Framingham, Mass., enables the manufacturer to operate his steam plant without wasting exhaust steam. The Edison company's service is utilized so far as is necessary to maintain an economical heat balance in the Dennison power plant, considering the use of process steam and local production of power from hour to hour. Two 13.8-kv. feeders serve the substation and direct-current service utilized in the factory by numerous adjustable-speed motors is obtained either from the local generators or from two 330-kw. rotary converters equipped with remote control and connected with the transformer sec-



UTILITY AND INDUSTRIAL PLANT CONNECTIONS FOR ECONOMICAL OPERATION

ondaries. The local plant contains three 850-kw. engine-driven generators. The rotary converter equipment is designed for full automatic operation, but the use of remote manual control suffices for these conditions, enabling the plant operating force to handle load and steam heat requirements with great flexibility and economy.

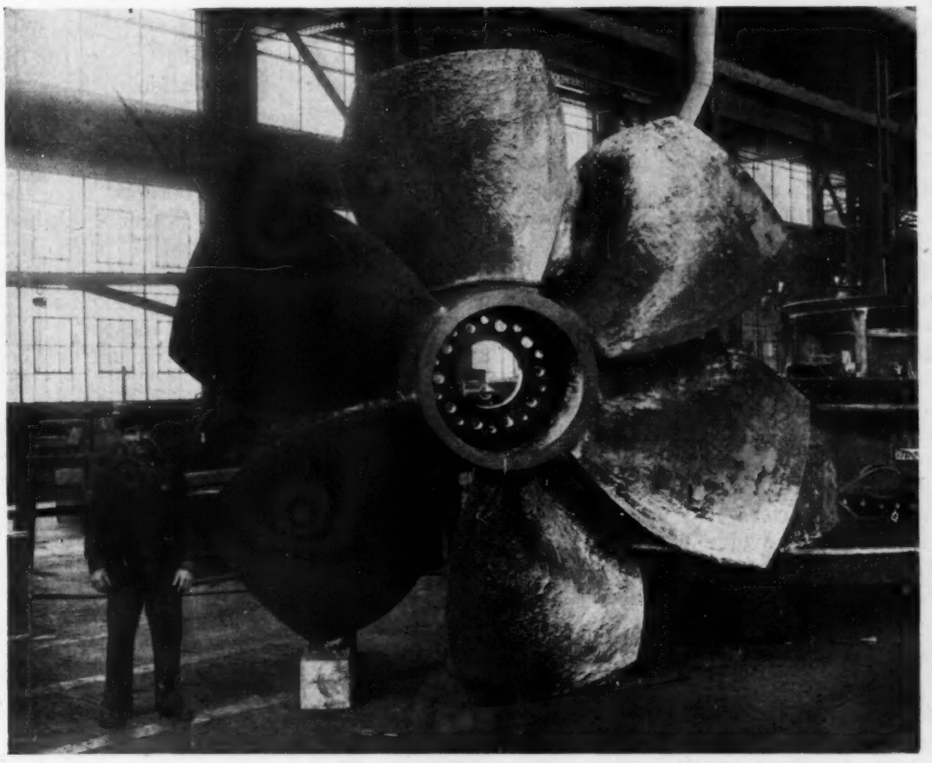
Field Test of Propeller-Type Waterwheel

West Buxton unit develops 92.1 per cent efficiency at 82 per cent gate opening, thereby exceeding the guarantee. Record size of runner involved

By GEORGE E. HAGGAS

Chief Engineer Cumberland County Power & Light Company, Portland, Me.

IN THE April 2, 1927, issue of the ELECTRICAL WORLD the engineering problems involved in the development of an addition to the West Buxton plant of this company on the Saco River were set forth in an article showing how this project enabled stream flow to be conserved. The waterwheel equipment of this development consists of a vertical six-bladed propeller type runner 133 in. in diameter with a Moody spreading draft tube, the rating being 5,400 hp. at 27-ft. net head and 120 r.p.m. In view of the statement of the turbine builder (the I. P. Morris Corporation) that this is the largest capacity propeller-type runner for a 27-ft. head ever built in this country and since the results of field tests of runners of this type have seldom been published, it is believed that a report of a test of this prime mover *in situ* will be of interest. The wheel was tested June 7 and 8 last, after three months' operation, the object being to determine the efficiency of the runner by ascertaining the output and the input. The output was measured electrically by instruments calibrated before and after the test. Outputs were corrected for (1) instrument errors; (2) phase angle and ratio corrections for current and potential transformers; (3) generator losses, including friction and windage, no-load core losses, short-circuit core losses and I^2R copper losses, and in the last case corrected for variations in temperature from 75 deg. C. No exciter losses were considered, as the generator was separately excited.



SHOP VIEW OF 133-IN. PROPELLER-TYPE RUNNER FOR 5,400-HP. TURBINE

The input was determined by observing the head and by measuring the quantity of water delivered to the runner. The head was observed by means of staff gages in the forebay and tailrace and by a water column connected to four piezometers located at the same elevation as the center of the distributor of the turbine and at the entrance to the concrete scroll. The net head was computed from the observed head by adding to the latter the velocity head at the piezometer section and by subtracting from this sum the velocity head at the exit of the draft tube. At full gate the net correction for velocity at the piezometer section and velocity head at exit amounted to 0.15 per cent of the observed head. The quantity of water delivered to the runner was measured by the salt velocity method.

SALT VELOCITY METHOD USED

This method of water measurement is based on the fact that salt in solution increases the electrical conductivity of water. At the West Buxton test salt solution was introducted into the pressure conduit just downstream from the head gates and the passage of this solu-

PARTIAL ASSEMBLY OF 5,400-HP. TURBINE

STAY RING FOR 5,400-HP. TURBINE

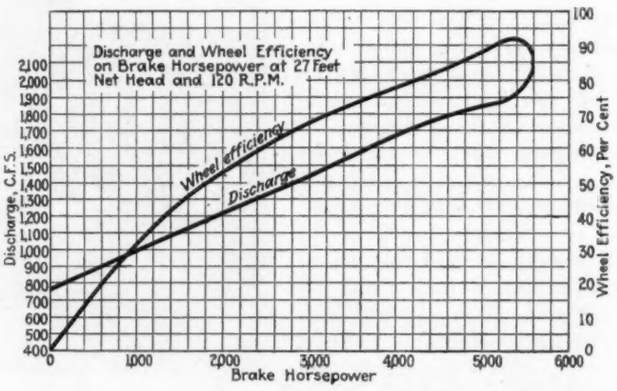
tion across four pairs of electrodes near the end of the pressure conduit was recorded on a chart by electrical instruments. The salt solution was injected through eighteen pop valves, which were located uniformly across the pressure conduit in the same vertical plane. The four electrodes were set vertically 190 ft. downstream from the pop valves and so spaced as to divide the cross-section of the pressure conduit into four equal parts. The pop valves were mounted on a pipe framework fastened to the walls, roof and floor of the conduit, all pop valves being piped back to a pressure storage tank containing a concentrated salt solution. The electrodes, each consisting of two steel bars 4x½ in., 17 ft. long and spaced 4⅛ in. apart by porcelain insulators, were anchored to the floor and roof of the conduit and each wired through a lead-covered cable to the recording instruments. The length of the supply line between the storage tank and the main header to which the pop valves were connected was 12 ft. In this supply line a quick-acting valve was installed and connected electrically to the recording instruments. The salt solution was prepared in a 250-gal. open mixing tank of wood and passed through screens to remove any foreign matter before draining into the 700-gal. steel storage tank. Compressed air was used to build up in this tank a pressure of between 40 and 50 lb. per square inch.

Upon signal the quick-acting valve was opened and closed almost instantaneously, which movements were recorded on the chart. This charge of salt solution under pressure was distributed by means of the pop valves over the entire cross-section of the pressure conduit. The time in seconds consumed between the operation of the quick-acting valve and the passage of the salt solution at the electrode section was accurately determined by means of a seconds-pendulum, the beats of which were also recorded on the chart. The volume of the pressure conduit between the pop valve and electrode sections was computed from field measurements made shortly after the construction was completed. The discharge in cubic feet per second equals this volume in cubic feet divided by the time in seconds. In this way the amount of water delivered to the waterwheel was determined.

During the test a total of 313 charges of salt solution was shot into the conduit, and 2,800 lb. of rock salt was used. These charges were grouped into 23 test runs at gate openings from 40 per cent to full gate. In computing the discharge of the runner the average of a number of the salt velocity shots made at each gate opening was used. The average of all head readings and of all electrical readings for each gate opening was taken into consideration. All test runs were numbered and recorded against the time of day. During the progress of the test the watches of all observers were compared at frequent intervals.

The outputs were determined by the Cumberland County Power & Light Company's forces and the input by Charles M. Allen, M. S., professor of hydraulic engineering Worcester Polytechnic Institute, Worcester, Mass., who developed and perfected the salt velocity method of measuring water.

The maximum efficiency of this runner at 27-ft. net



EFFICIENCY TEST CURVES, 5,400-HP. PROPELLER-TYPE WHEEL

head and 120 r.p.m. was found by Professor Allen "to be 92.1 per cent at gate openings of 80 to 82 per cent and 5,330 to 5,400 brake horsepower. This is 95.2 to 96.4 per cent of the maximum power developed by the wheel at full gate opening. At full gate the wheel developed a maximum of 5,600 brake horsepower at an efficiency of 87.1 per cent. Professor Allen further states in his report that "the salt velocity test section for this unit was sufficiently long and enough runs were made to obtain results for water measurements accurate to well within 1 per cent of the true values of discharge." The discharge at best efficiency and 27-ft. head is 1,895 cu.ft. per second. The maximum discharge is 2,100 cu.ft. per second at full gate. The actual efficiencies of this waterwheel exceed both the guaranteed and expected efficiencies of the turbine builders.

The over-all efficiency at the switchboard of the new West Buxton development from pond level in the fore-

bay to tailwater is between 86.5 and 87.0 per cent. This takes into consideration the losses at the intake entrance through the racks, in the pressure conduit and all other hydraulic losses, as well as the losses in the waterwheel and generator.

Curves prepared by Professor Allen from the actual test data, as well as photographs of the runner, shop view of partial assembly and cast-iron speed ring of the turbine are reproduced herewith.

The cost of this test, including labor and material for the installation and the removing of pop valves, electrodes, pressure and mixing tanks, salt and engineering, was $3,988.20.

Operation of Supervisory Control

BETWEEN the load dispatcher's office of the Milwaukee Electric Railway & Light Company and its Granville substation a supervisory control system has been in operation now for about eight months. This system is arranged to control a 30,000-kva. bank of 26 kv./132 kv. transformers. In addition it furnishes the load dispatcher with load and voltage indications on the transformer bank, indicates dangerous temperature in these transformers and shows up any trouble in its own motor-generator in the substation.

The system is of the type that checks its own operations and conditions at the end of every half-hour. So far as its ability to do the work is concerned there has not yet been any occasion when necessary control operations could not be performed through it.

When the system was first installed, it was energized from a control battery at one end instead of by the motor-generator set prescribed for it. It was felt that, since the battery was available, the motor-generator set would not be necessary. However, this idea very shortly was proved to be a mistake, because grounds on the circuit supplied by the control battery and extraneous to the supervisory system reflected trouble into the system. These grounds were in many cases of sufficiently high resistance to be negligible in the original circuit which the battery served, but they were strong enough to cause trouble in the supervisory system. Another condition of the control battery that affected the supervisory system was voltage variations caused by heavy loads on the control circuit.

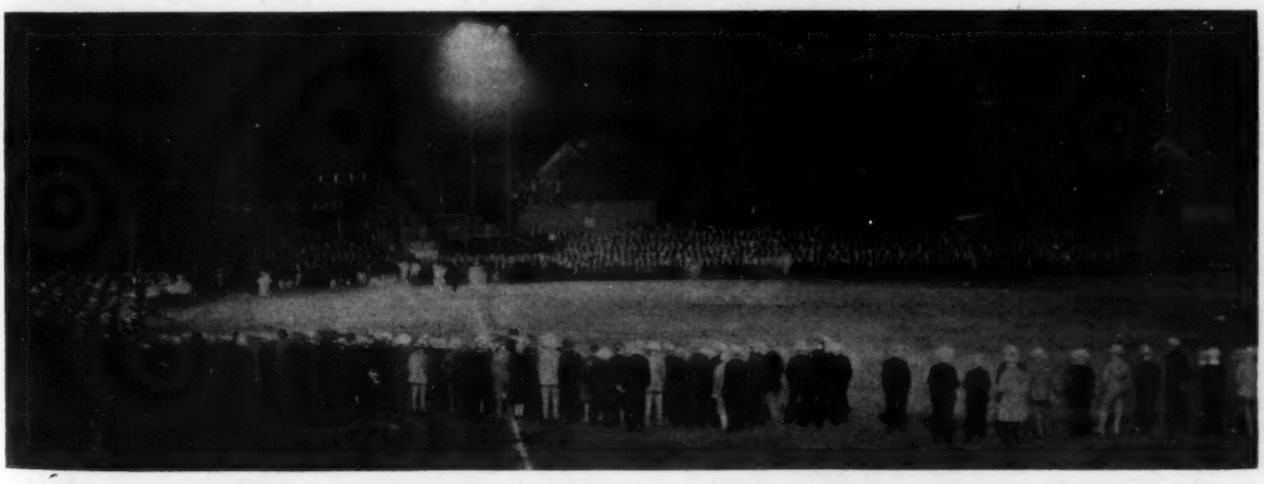
Another thing that was discovered to have caused trouble in the supervisory system was moisture in the fiber blocks separating the main and auxiliary contacts of oil switches. Sufficient current flowed across these blocks to affect the supervisory circuit. The trouble conditions here recited usually caused the indicating equipment to jam when the periodical half-hour check-ups were made. These troubles, however, were very easily located and have not been considered to be any derogation to the supervisory control system itself.

On April 26 tests were being made on spare conductors in the supervisory control cable between the Public Service building and Granville. A connection was installed from one spare conductor to the grounded cable sheath and two other spare conductors were shorted together at Granville. Under this condition and when no tests were being made, one of the 26,400-volt lines feeding from the Granville substation grounded and opened at Granville. Ground current picked up by the grounded conductor and induced voltages on the conductors being used on the supervisory set caused the set to start, get out of step and finally to jam. It was restored to normal by merely pressing the reset button at the load dispatcher's board.

Before the case was fully analyzed and before the ground was removed from the spare conductor the trouble repeated itself. On this second case of trouble sufficient voltage was induced on the active conductors of the cable to blow 5-amp. fuses at the Public Service building. Other than blowing these fuses no damage was done, the set functioning properly after replacing the fuses. Since that time 10-amp. fuses have been used.

Baseball at Night

BASEBALL played at night promises to furnish a new and attractive load for power companies, according to the opinion of competent observers who recently attended a full-fledged evening contest at Lynn, Mass., between the Salem and Lynn teams of the New England League. The field area was 80,000 sq.ft., and the average intensity of illumination on the ground was 6.01 foot-candles. The lighting equipment consisted of six towers, each carrying twelve L-22 General Electric floodlight projectors equipped with 1,500-watt, 110-volt, type C lamps. The towers were arranged in banks with four floodlights each, the first bank being 47 ft. above the



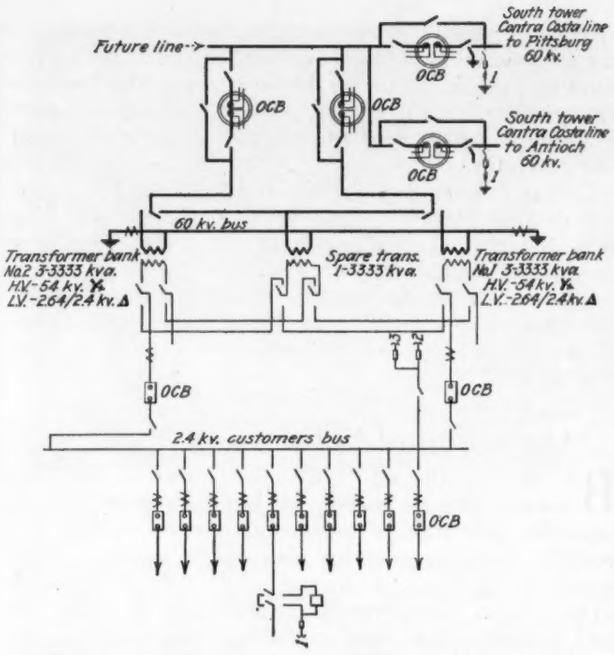
80,000-SQ.FT. BASEBALL FIELD ILLUMINATED TO 6 FOOT-CANDLES BY 72 1,500-WATT FLOODLAMPS

ground, the second 49 ft. and the third 53 ft. Twenty-five of the 72 units were focused in the air to form a canopy of light over the field. There were 135,850 beam lumens in the air and 753,350 on the ground, a total of 889,200 lumens. The installation cost was about $13,000, and 30 kw. was required for the air canopy and 78 kw. for the ground. Seven innings were played with but two errors; the score was 7 to 2. Sports writers and big league baseball authorities present were enthusiastic over the results, even the high fly balls being visible. F. W. Ralston of the General Electric Company was in charge of the lighting installation.

Duplicate 60-Kv. Lines Feed Large Industrial Substation

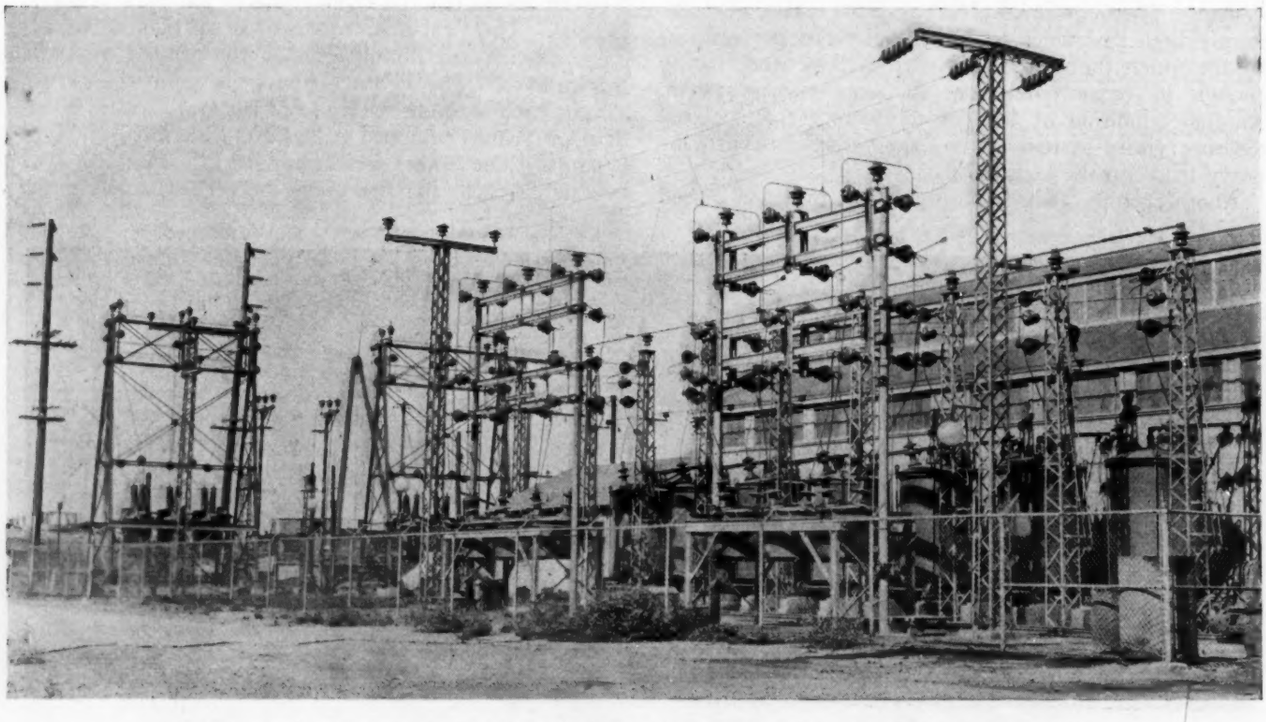
POWER for the Columbia Steel substation, the largest industrial substation on the system of the Pacific Gas & Electric Company, is received from two 60-kv. lines through an arrangement of circuit breakers and relays such that in case of trouble on either line the faulty circuit will be automatically switched out, permitting delivery of power from the remaining line without interruption.

The substation is entirely outdoors with the exception of the customer's 2,400-volt bus and feeder circuit breakers. Two transformer banks of 10,000-kva. capacity each are located adjacent to the customer's substation building, permitting the use of short bus connections between the transformers and the indoor 2,400-volt bus. The transformer banks each consist of three 3,333-kva. water-cooled transformers. A spare transformer of similar rating is provided, and in order to facilitate its substitution in place of any other unit, transfer buses with suitable disconnecting switches are employed, thereby reducing to a minimum the time required for cutting in the spare transformer. Both banks are protected on the high-voltage side with automatic oil circuit breakers, but on the low-voltage side the oil circuit breakers are non-automatic, being of low interrupting capacity, and are used for disconnecting purposes only.


Future line
South tower Contra Costa line to Pittsburg 60 kv.
South tower Contra Costa line to Antioch 60 kv.
OCB
60 kv. bus
Transformer bank No.2 3-3333 kva. H.V.-54 kv. Y. L.V.-2.64/2.4 kv. Δ
Spare trans. 1-3333 kva.
Transformer bank No.1 3-3333 kva. H.V.-54 kv. Y. L.V.-2.64/2.4 kv. Δ
2.4 kv. customers bus

SINGLE-LINE DIAGRAM OF CONNECTIONS FOR COLUMBIA STEEL INDUSTRIAL SUBSTATION

Power delivery is made to the customer's 2,400-volt bus located inside the substation building, from which the various 2,400-volt feeders radiate, some overhead and some underground. Connections to the bus from the main transformers are made at two points, where current transformers are installed for metering. Two watt-hour meters are used and a duplex device combines the demands from the two sources.



HIGH-TENSION SWITCHES, BUS AND TRANSFORMERS, COLUMBIA STEEL SUBSTATION, PITTSBURG, CAL.

Courts Are Now
More Specific on Depreciation

Early decisions disregarded it. Recent tendency is to prescribe exact percentage to be allowed. Citations given from number of court cases.

By L. L. STARRETT
Commonwealth Edison Company

Couched in legal and highly technical phraseology, much that is written on depreciation is unintelligible to the lay reader. L. L. STARRETT, *of the Commonwealth Edison Company, traces the depreciation problem through the leading court cases and points out in non-technical language the steady trend toward a definite insistence by the courts that depreciation be definitely provided for.*

IT IS interesting to note that utilities operated for considerable time without Supreme Court decisions to guide them in their policies of valuation. The first case on record dealing therewith was Smyth vs. Ames, decided in 1898, which considered "the present as compared with the original cost of construction." No mention was made therein of deducting accrued depreciation in order to arrive at "fair value." For the next ten years little was decided as to the exact status of depreciation allowance. One case did arise, however — namely, San Diego Water Company vs. City of San Diego, in which case future retirements above maintenance and repairs were discussed and such allowances were denied. Of the six judges who decided the case only one, Judge Bentley, gave a dissenting opinion. This was:

> **As to current expenses, all operating expenses reasonably and** properly incurred, should be allowed. Taxes should be allowed, and the cost of current repairs.
>
> In addition to this, if there is any part of the plant, such as main pipes, etc., which at the end of a term of years will be so damaged and worn out as to require restoration, an annual allowance should be made for a sinking fund sufficient to replace such parts of the plant when it is worn out.

Although a dissenting opinion, Judge Bentley's view of the case, as set forth, did have weight in the Redlands Water case. In this case the lower courts held:

> The rates therein prescribed would not yield a revenue sufficient to enable it to pay the interest on its indebtedness, its operating expenses and taxes, and for keeping the plant in repair and replacing same.

This case reached the appellate court, which referred to its previous decision in the San Diego ruling and reversed the holding of the lower court.

In the year 1909 a clear presentation of the subject of depreciation was brought before the Supreme Court in the Knoxville case. The discussion of depreciation arose in this case because the water company contended that it had a right to include in the case the value of its property—not only the survived property but also that which had entirely disappeared because of the inadequate reserves. The court realized that allowances should be made for depreciation, but it could not allow for mistakes made in the management in previous years. The language of the court was:

> It is entitled to see that from earnings the value of property invested is kept unimpaired, so that at the end of any given term of years the original investment remains as it was at the beginning.
>
> When, therefore, a public regulation of its prices comes under question, the true value of the property then employed for the purpose of earning a return cannot be enhanced by a consideration of the errors of management which have been committed in the past.

Several decisions followed the Knoxville case in which deductions for depreciation were made. In 1913 the Supreme Court decided the Minnesota rate case, in which depreciation was given considerable attention A summary of this case, as given by L. R. Nash, is as follows:

> It must be remembered that we are concerned with a charge of confiscation of property by the denial of a fair return for its use; and to determine the truth of the charge there is still to be ascertained the present value of the property. . . .
>
> And when particular physical items are estimated as worth so much now, if in fact they be depreciated, this amount should be found and allowed for.
>
> If this is not done, the physical valuation is manifestly incomplete.

In these two cases no mention is specifically made of accrued depreciation being deducted from the actual or estimated cost of the property. The Knoxville case, however, mentioned the gradual waste of property and that provisions from earnings should be maintained to take care of this loss.

COURTS TAKE A MORE DEFINITE STAND

The Supreme Court in the Lincoln Gas & Electric Light Company vs. the City of Lincoln (223 U. S. 349-1912) became quite definite in speaking of estimated depreciation. The language of the court was:

> The question as to what sum, if any, upon the facts of the case should be annually deducted from the net income as a permanent maintenance of replacement fund is novel and presents a grave problem. So far as can now be seen, reconstruction of replacement charges have been borne by current revenue. If, in the past, replacement or reconstruction charges have been met out of current expenses, the past must be taken into consideration,

both when we come to estimating future net income and in determining what sum shall be annually set aside to guard against future depreciation. . . . If the constantly recurring necessity to do reconstruction or replacement work was in 1907 met from current income of that year, thereby diminishing the net income, the fact should be given weight in estimating future net income, otherwise there would be a double deduction on that account, first by paying such charges as they occur and thereafter by a contribution out of the remaining income for the same object.

The Supreme Court of Idaho rendered a decision in 1915 more in keeping with present-day views. The following language was used in Murray vs. Public Utilities Commission (159 Pac. Rept. 50):

So far as the question of depreciation is concerned, we think deduction should be made only for actual tangible depreciation, and not for theoretical depreciation. In other words, if it be demonstrated that the plant is in good operating condition, and giving as good service as a new plant, then the question may be entirely disregarded.

The year 1926 brought forth some very conservative and thoughtful decisions as well as those that seem radical in comparison with the past history of the courts. Some recent language of decisions is as follows:

A reasonably strong depreciation reserve, if the company does not attempt to pay dividends based thereon, inures to the advantage of the company and its customers by reducing the amount of interest or dividends that the company is obliged to pay to secure capital to maintain its financial integrity.

* * *

Any estimate of annual depreciation requirement should be based upon the investment in depreciable property rather than the reproduction cost.

* * *

An allowance of 5 percentage of the depreciable property of a telephone company was considered adequate to cover annual accruing depreciation. (Missouri Union Telephone Company, 1926.)

* * *

A water utility's annual depreciation was fixed at 3.13 percentage of the average plant value, exclusive of land. (Department of Public Works, ex rel. Carson Development Club-Carson Water Company, Washington, 1926.)

The language of the courts differs greatly from that used in the Knoxville case, it being more definite and straightforward. The cases mentioned show clearly that the courts believe firmly in depreciation, an issue dodged completely in earlier decisions, and that a specific amount should be allowed for that purpose. Of course, a definite percentage set up in some particular case does not mean that such a percentage shall be used as weight in following cases, since each utility has its own particular problem. One can gather a trend, however, which will show the tendency of the courts.

It is naturally to be expected that courts will move forward slowly and conservatively in their decisions touching upon the depreciation of the property of public utilities. Occupying, as the utilities do, a comparatively new place in the industrial world, much legislation is expected to arise governing their status, and consequently courts will naturally seek to maintain their own position as judicial and not legislative in such matters.

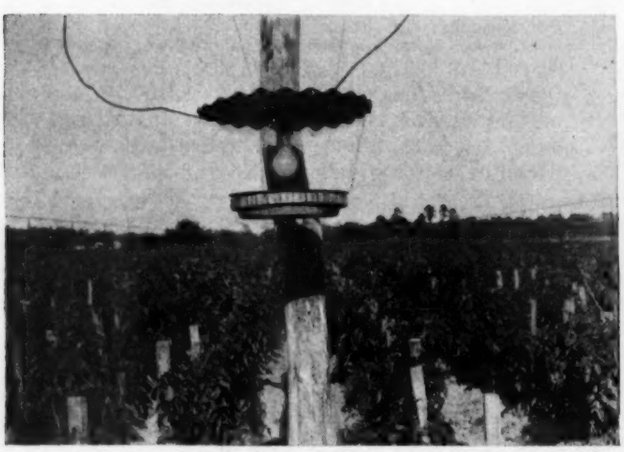
Infestation of Tomatoes Prevented by Lights

By E. C. Easter
Agricultural Engineer Alabama Power Company, Birmingham, Ala.

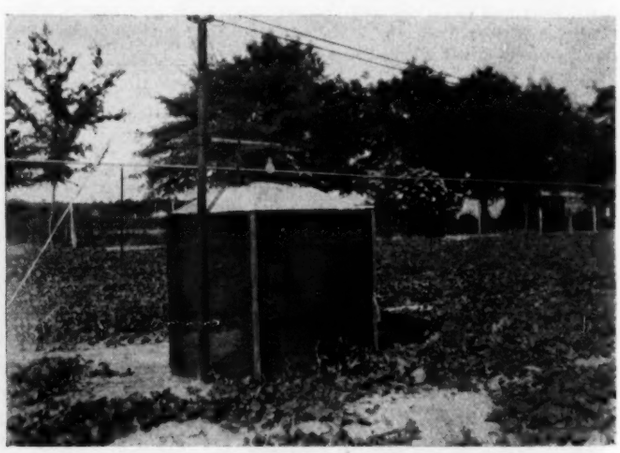
IN 1926 much damage was done to tomato patches in Alabama by fruit worms, the adult stage of which is a moth. As a result it was decided this year to install electric lights in a tomato patch to see if these moths could be trapped, thus preventing them from laying eggs. Although the results obtained to date are not conclusive, they indicate that a great deal of good is accomplished. This work is being done by Professor J. M. Robinson, head of the entomology department of the Alabama Polytechnic Institute, in conjunction with the Alabama Power Company, and the farm of S. P. Storrs, in Elmore County, is being used for the experiments.

The installation consists of eight lights spread over a two-acre patch. The lights are adjustable, but the best results appear to be obtained when they are about 5 ft. above the ground. As shown in an accompanying illustration, a 20-in. flat reflector is used, under which is hung a pan of water covered with kerosene. Of the eight lights, six are 100 watts, one is 200 watts, and the other is 40 watts. These are clear, though experiments have been made with inside frosted lights.

From the two-acre patch, approximately 40,000 lb. of tomatoes were sold. This represents about 136,000 tomatoes. A very energetic effort was made to determine how many tomatoes in this patch were damaged by fruit worms, and only 35 worm infested tomatoes were found on the two acres during the entire system. Mr. Storrs' neighbors who produced tomatoes without the use of lights had an infestation of from 30 per cent to 50 per cent.



LIGHTING OF TOMATO PATCH PRACTICALLY DOES AWAY WITH TOMATO WORM INFESTATION



EQUIPMENT BEING USED TO CATCH THE PICKLE BEETLE, ENEMY OF MELON PRODUCTION

The trap shown beneath the light, in the illustration at the right, is used to catch the various insects so that they can be classified.

Three lights are also being tried out in a cantaloup patch of one acre. In this patch efforts are made to catch the pickle beetle, one of the most serious enemies of melon producers.

As may be noted from the illustration, the tomato patch is supplied with water from an overhead irrigation system, which was in use last year as well as this. By using this irrigation system the tomatoes are ready for market several weeks before tomatoes not so watered. Also approximately five times as many can be raised in this way as can under normal field conditions. Assuming that Mr. Storrs would have suffered the same damage without lights that was experienced by his neighbors, the lights resulted in a saving of at least 12,000 lb. of tomatoes. At ten cents per pound, for tomatoes (the minimum price received by Mr. Storrs) the above saving amounted to $1,200.

Paying Commissions on Sales

THE practice of paying commissions on sales on a basis of profit accruing to the manufacturer rather than on the basis of dollars' worth of goods sold is having a wider application in many industries. Manufacturers who attain to this method of remunerating salesmen have found it to be decidedly advantageous. Jobbers using this system have also found it more profitable. Some items require virtually little sales effort, and owing to the volume of sales represented by such products the total is fairly large, although in many cases the profits are quite small. Other items require greater sales effort and accordingly should carry larger sales expense and greater profit. It has been difficult to apportion any particular percentage, especially in the case of a manufacturer offering diversified products, so that adequate remuneration would accrue to the salesmen and a fair profit to the company. The system of paying commissions on the basis of profits has thus been of sound origin.

A manufacturer who pays all the managers of his distributing branches on a profit-sharing basis has found the result to be very satisfactory. He has found that the branch offices, which formerly prided themselves on total sales, now bear an entirely different relation to the company and base their accomplishments on profits rather than on sales.

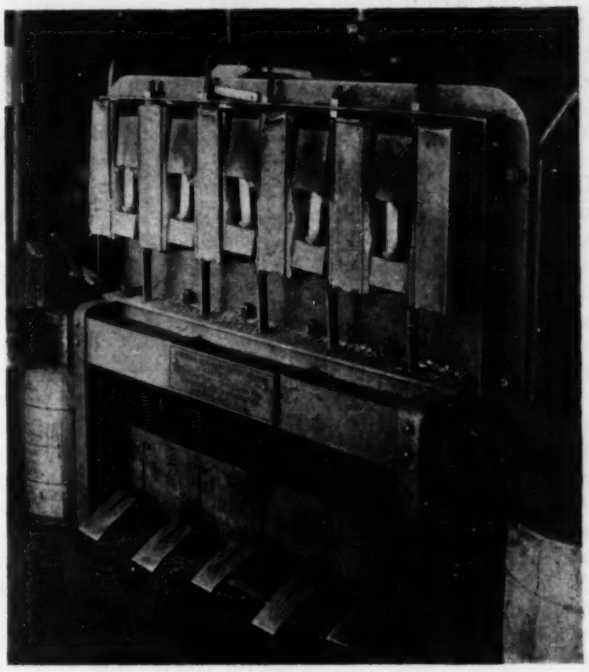
This manufacturer states that the three decided advantages are:

1. More efficient operation of distributing offices.
2. Better effort on the part of branch managers.
3. A decided reduction of requests to the main office for lower prices.

The lessening of requests for lower prices is indicative of what can be done if the effort is made and incidentally a stronger organization is built up. Price demoralization ceases to be a factor and salesmen become less panic-stricken when they are told that a competitor is quoting a lower price. As is well known, a buyer's intimation that a lower price is quoted may, and often is, a statement that can be made only with many qualifications, including delivery, type of material, terms, discount and so forth. Salesmen under this commission system thus make a better attempt to sell their products on merit rather than on price, with the result that their effort is reflected on the balance sheet of the company as well as in their salary.

Rivets Heated Electrically at Less Cost and More Comfortably

OIL forges for rivet heating have been replaced by electric heaters in the shop of the New England Structural Company, Everett, Mass., because the latter cut down the excessive cost of heating, improved working conditions, eliminated pipe connections and the burning of forges and cut the losses from burned and scaled rivets from 10 per cent to less than 0.5 per cent. In this plant seven Berwick heaters handle from 3,000 to 4,000



RIVET-HEATING FURNACE REDUCES BURNING AND SCALING 0.5 PER CENT

rivets per day, one two-electrode, three three-electrode and three five-electrode outfits being in service. The heater illustrated has a capacity of 400 1x5-in. rivets per hour. The maximum demand with five rivets in the machine is 65 kw., but in practice the 30-minute demand does not exceed 25 kw. This equipment facilitates the fabrication of structural members in the shop instead of in the field.

Full Loads for Line Extensions

HIGH initial loading of line extensions, to be secured by sales efforts preceding the erection of the proposed lines, was urged by B. M. Fast, sales manager of the Associated Gas & Electric Company, in his address to the Empire State Gas and Electric Association in Elmira, N. Y., recently. Mr. Fast also appealed for co-operation with the electrical contractor and the inauguration of a policy of wiring sales by the utility company, to be financed by commissions paid for such services by the contractor.

On a new extension where rural rate minimums are not effective and where there is enough business to warrant the extension the prospective consumers in Associated Gas & Electric Company territory are told that the company is ready to spend the money to serve them and

that if they will get together and have all the wiring done at the same time, an effort will be made to secure enough signed contracts to warrant the extension. If the requisite number are not secured, the contracts will be returned to them. A quota of 80 per cent of the homes in the area to be served is set and obtained. There is no question of the saving possible for the construction department when 25 miles of line, with distribution system, service transformers, services, meters and street-lighting system, can be installed at one time.

"This method gives us 80 per cent saturation," declared Mr. Fast. "The old plan of building on a petition and expecting the business to come afterwards results in 40 to 50 per cent saturation. After the lines are built the business comes doubly hard. Don't build lines on a petition; build them on signed house-wiring contracts only. It is the modern way.

"The time to secure the business is before the lines are built, but in any event we must do the selling for the contractor. Such a plan costs the customer no more and he gets a more complete job of wiring. We have at the present time in the associated system eighteen salesmen selling house wiring. Their payroll is approximately $3,500 per month and the contractor is paying it and paying it gladly."

Plan Successful

The plan used has been successfully employed in ten states and in three Canadian provinces, according to Mr. Fast, and is based on the assumption that if the contractor is not required to spend time hunting business, he can keep busy wiring houses and can afford to give the utility better prices for a customer's job and make more money than before. Experience has shown that a more complete wiring installation can be made, as the customer senses no pressure to overdo the job but will recommend what he really needs. The company is not up against keen intercontractor competition in securing the work.

The electrical contractor who sees the advantages in this plan is willing to quote prices based on a quantity business. Under the plan outlined by Mr. Fast, the contractor arranges to finance and handle all time payments and pays a 10 to 12 per cent commission for all contracts turned over to him. This commission is paid to the salesman, who is guaranteed a weekly drawing account by the utility with adjustments against commissions paid over three-month periods.

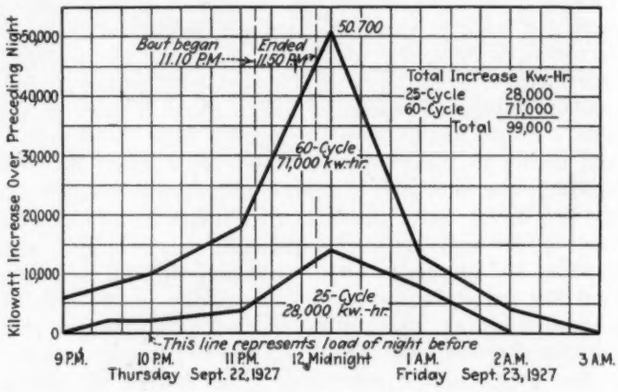
The commission charged is added to the prices given by the contractor. The prices are lower than those prevailing in a territory prior to the start of a campaign, so the customer benefits by the plan also. The salesman works, under supervision from the utility offices, as a lighting company representative. He is hired and trained by the manager of the house-wiring department. On new line extensions where rural rates are in effect, with a monthly minimum fixed by the number of customers per mile, the salesman makes it a point to explain thoroughly the way the minimum is figured and shows prospects that there are enough possible customers to get a lower minimum if all will sign up, with the result that by a little effort the maximum number are secured. No one is in better position to explain this than the lighting company salesman, and he can take the time to do it. Mr. Fast said that he felt it to be better to secure all the places on an extension with a $3 minimum than one-half of them at a $6 minimum, because of the larger merchandising field which was offered.

Dempsey-Tunney Fight Increased New York Load 51,000 Kw.

BROADCASTING of the Dempsey-Tunney fight from 72 stations Sept. 22 afforded the electric utility industry an unusual opportunity to study the effect of radio on the electric light and power business. One striking observation was made in New York City, where the load increased 51,000 kw. more than on the previous night and the energy consumption swelled nearly 100,000 kw.-hr.

Extracts from the radio talk of Arthur Williams, vice-president of the New York Edison Company, speaking through W R N Y during the "Edison Hour" Sept. 27, explain the experience in New York. Mr. Williams said:

"It will be remembered that the radio service was announced to begin at about 10 o'clock. The records of these plants* show by the increased loads that radio users began to tune in for the fight at about 9 o'clock; at 10 o'clock the plants were carrying about 10,000 kw. more than their normal load for that hour; at 11 o'clock about



NEW YORK ENERGY CONSUMPTION INCREASED 100,000 KW.-HR. BY CHAMPIONSHIP BOUT

18,000 kw.; and at 12 o'clock, just after the contest ended, the excess load reached 51,000 kw. At 1 o'clock it continued at about 14,000 kw., and the excess load did not fade entirely away until almost 3 o'clock in the morning, indicating the extent to which those who had been listening in stayed up to discuss the results. In all, more than 100,000 kw.-hr. was used by our New York customers.

"The curve itself is very interesting; the most acute rise began at 11 o'clock, when apparently great numbers of listeners-in returned from dining or the play, and as the output continued to increase acutely until 12 o'clock, it would seem that by far the largest number came on the air toward the end of the contest. This excess load above the normal indicated a connection of perhaps one and a half million incandescent lamps in this immediate section alone. All evidently were used in the homes of customers and indicate something of the extent to which radio service is entering into the daily life of New York as a means of quickly acquiring the important news of the day, of education and entertainment."

What the effect on the entire country's electric load and energy consumption was can only be estimated after analyzing experiences of other companies. However, the one observation related does show very positively that

**The United Electric Light & Power Company and the New York Edison Company.*

electric light and power companies' evening loads and revenues are increased when broadcasting programs of wide popular appeal are made and in proportionate amount as the appeal may be less extensive. It is possible that the effect of the championship-fight broadcast may have been underestimated, as it was compared with conditions the previous night. That night the Radio Industries banquet was broadcast over a very large number of stations and attracted a larger-than-normal listening audience, according to estimates of the National Broadcasting Association.

Letters from Our Readers

Understandable Rates

To the Editor of the ELECTRICAL WORLD:

The frequent articles on rates printed in the last six months lead to the reflection that while every utility should work out its own rate, every detail of costs from the coal pile to the checking account having its bearing, there is no reason why this rate cannot be brought down to a simple figure—one that the customer would readily understand when contracting and when he receives his bill. To inject into the customer's bill all the factors resulting from demand, power factor, time element and peak and off-peak service is a confession of weakness upon the part of the utility serving him. He passes his opinion of the amalgamated superpower on to other customers, and, instead of inspiring that much-coveted good public relationship, creates a condition of unrest and skepticism, eventually bringing about additional legislation, regulation or something to hurt the growing business.

Simplicity in public relations is simplicity in monthly bills, with as few steps and penal clauses as possible. There is nothing that stirs a man's nature like something he has to pay for though he doesn't know what it is all about. You may talk in terms of any unknown quantity and receive applause, but when the cash side of the question is touched your language must be to the point and clearly understandable. This applies directly to the public utilities, which are wrong when they endeavor to obscure their inability properly to place certain charges by using terms of unknown significance so far as the public is concerned. It certainly cannot be hoped that the public can be made to understand such charges when engineers have spent years in trying to arrive at a method under which each class of business may be properly placed.

Another phase of this business is that of the residential customer, who for many years was classed as unprofitable and only served and tolerated for fear of this influence. Of recent years this business has grown from a liability to an asset, although most of the public service bodies would yet keep it unprofitable. For this situation the low minimum charge allowed by regulatory bodies is the direct cause. Commissioners should stand and look over the cashier's shoulder during the long-day months and see the great number of minimum bills that are paid daily. They would then see for themselves that the cost of accounting is barely cared for, much less the heavy investment charges and the maintenance and heavy service expense involved in rural sections. Let the conventional top rate be cut off and these customers served at a reasonably low starting rate, but keep up the minimum charge so that they will have to use enough electricity to pay their way. This will work no hardship, because there are many appliances that every household can profitably use. It will be no trouble for them to use their $1.50 minimum every month, thereby placing themselves on the asset side of the ledger instead of being a liability and compelling other or larger consumers to carry them along during the summer months.

Every utility knows the advantage of trying to get thousands of customers to use larger quantities of energy at 12 cents for the first 30 kw., in order that they may get a lower rate on the rest of their bill. It is just like asking them to hand over a contribution toward expenses —that is, if they have a 50-cent or 75-cent minimum. Thousands will use just that much and no more, regardless of educational campaigns. If, however, they know that they are to use or pay for electricity to the extent of $1.50, but get a much lower rate by so doing, then one has a satisfied, boosting customer, because he gets something for the money he spends.

The larger companies of today, which are buying up so many small properties, should also look to the question of service to the smaller towns and not forget that there is growing dissatisfaction in these towns due to the frequent interruptions of service, often just when something of importance is to be done or some special event going on. The network of lines built on a cheap scale and with the poorest lightning protection imaginable is going to be the undoing of long-distance transmission. It is not the question of a few cents in rates that will tell. Merchants who are without service on a Saturday night may well afford to pay a higher rate for assured service from a local plant. No amount of oil can calm these waters when once they are stirred up. No amount of talk can appease a town where the citizens have been without light for a night or two every month or so.

L. D. SHANK,
Manager.

Municipal Light and Water Department,
Dover, Del.

The Statistical Accountant's Place in the Industry

THE accountant with broad experience that lifts him above ordinary routine is able to stand between the engineer, the commercial man, the ordinary accountant and executive on the one hand and disaster or at least wasted effort on the other. He may know nothing about engineering, but he does know how to keep data and so to contribute to the solution of engineering problems.

The accountant's fundamental training is to make figures that agree. It is he who decides what is right when the question arises of comparing inconsistent data prepared by different departments.

If a board of directors faced the problem of choosing an executive from four men of equal ability—viz., a typical engineer, a salesman, an auditor and a statistician with a set of accountant's tools in his possession—they would, in my opinion, do better to choose the last of the four. Monotonous though his work be, I think there is more room at the top for the type of man I have described and a better chance to make good than some that are more in the public eye. In the last analysis his judgments on matters brought under his direction are more likely to be correct, and he stands a better chance of success than his associates who lack his kind of training.—*From an address by* CHARLES L. EDGAR *before the New England Division, N.E.L.A.*

Digest of Electrical Literature

Generation, Control Switching and Protection

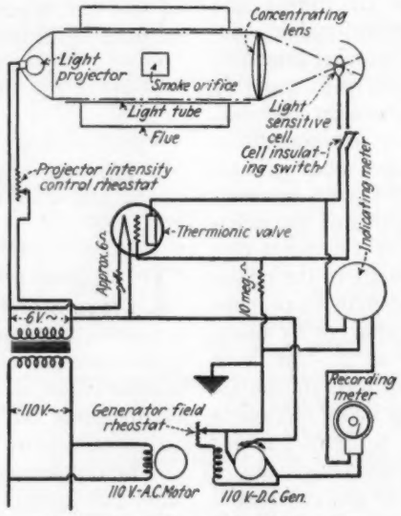
Relay Protection of Queenston Generators.—T. R. MILLER and J. C. MARTIN.—The protection of the 450,000 kva. of hydro-electric generating equipment at the Queenston generating station of the Hydro-Electric Power Commission of Ontario is effected by the use of an ungrounded neutral system. Each phase of the generator winding is split into two halves, with the leads of each half brought out of the generator frame at the terminal and neutral ends. The generators are connected, through a non-automatic circuit breaker, to their respective transformers and provision is made to parallel them by means of a 12-kv. synchronizing bus through an automatic circuit breaker and reactor. No 12-kv. power is delivered from the station. The protection for the generators consists of a combination of differential current and split phase to operate on internal generator short circuits and to open the necessary circuit breakers to isolate the unit completely. The generators are operated with ungrounded neutrals. The tripping of main circuit breakers, field circuit breakers, ventilating fans and air dampers is accomplished through the medium of a small contactor which furnishes tripping current to the unit trip bus and trips the annunciator drop. Current from this bus operates small contactors which trip all breakers and completely clear the generator. The current-transformer leads are wired to test link cabinets installed near the generators to facilitate testing. From these cabinets the circuits are carried in conduit to the relay panels, which are installed in the control room.—*Electrical News (Canada)*, Sept. 1, 1927.

Transmission, Substations and Distribution

Electric Oscillations in the Double-Circuit Three-Phase Transmission.—Y. SATOH.—The investigation and research conducted by the author follow the lines of a previous study of the electric oscillations on a three-phase aërial line by Dr. Bekku. It is demonstrated that there are three kinds of traveling waves; that is, a wave between conductors of the first circuit or between conductors of the second circuit, a wave between the group of six conductors as one side and the ground as the other and a wave between the group of three conductors of one circuit as the one side and the group of three conductors of the other circuit as the other. The nature of these waves and some of the important results of the induced transients are described. In the appendixes it is shown briefly just how these results were derived and how to calculate the line constants from the construction data of the lines. Numerical examples illustrate the methods outlined. The discussion is highly mathematical, and the solutions proceed upon the assumptions that the characteristics of the two circuits are electrically the same and that the conductors in each circuit are in the same position with respect to one another and to the ground; that is, the transposition of each circuit is complete.—*Journal of the American Institute of Electrical Engineers*, September, 1927.

Hydro-Electric Development and Steam Equipment

A Smoke-Density Meter.—FRANK SAWFORD.—A résumé of the various types of indicators utilized for determining the density of smoke emitted from factory and power-plant chimneys is included by the author. The shortcomings of the several types of apparatus led to the development of a device functioning through the use of a photo-electric cell. It consists essentially of a photo-electric cell and amplifying vacuum tube which permit an indication and record of the actual density of smoke in practical units and is designed for continuous operation as a boiler-room instrument. The device consists of two principal parts. One part, which may be termed the instrument proper, consisting of an indicator or recorder or both, is mounted at any suitable location convenient to the operator and contains current-amplifying apparatus forming a complete self-contained unit. The second part, or optical system, is placed in the smoke-flue or chimney at any accessible point, preferably at a point where the temperature of flue gases is not excessive, although the usual flue temperatures from boiler outlets are not detrimental. This part of the equipment consists of a length of 3-in. iron pipe inserted through the flue or stack. At the midpoint of the pipe length is cut an elongated opening for a smoke orifice extending through both walls of the pipe. The orifice is placed parallel to the stream flow of the flue gases. The area of this orifice bears a relation to the area of the flue and the velocity of the gases. At one end of the smoke-orifice pipe a cast-iron bracket and a lamp giving a parallel beam of light is placed. The lamp is mounted on a spring-hinged adjustable arm to enable a correct adjustment of the beam. A 6-volt, 21-cp. concentrated-filament lamp is used. At the other end of the smoke pipe is attached the light-sensitive cell, together with a concentrating lens, mounted directly upon the end of a bracket. The photo-electric cell is in the form and size of an ordinary 60-watt electric lamp and has a standard screw base for use in an electric light socket. The indicating scale is marked with divisions from zero to one hundred, corresponding to clear and dense smoke conditions. The meter is a milliammeter with a full-scale rating of 10 milliamperes and is also fitted with high-resistance coils and a push-button switch to enable voltage readings to be taken for checking purposes. A small motor-generator set mounted directly on the panel with the instrument supplies direct current for its operation.—*Mechanical Engineering*, September, 1927.



SCHEMATIC ARRANGEMENT OF SMOKE-DENSITY METER

Motors and Control

Double-Cage Versus Single-Cage Motor.—L. SCHÜLER.—The advantages of a double-cage rotor for three-phase induction motors have been stated on various occasions in late years. It has been claimed that their starting torque is higher and that the pull-out characteristics are more favorable. A close investigation of these claims seems to show that these advantages hold true in only a few special applications. By comparing data from a standard squirrel-cage and a double-cage motor, both of 5 hp., the author substantiates his claim. He goes further to show that a standard motor, which is equipped with a modern centrifugal clutch coupling of the pulley type, serves in many cases to better advantage.—*Elektrotechnische Zeitschrift*, Aug. 11, 1927.

Pipe-Type Motor Pump.—K. WAIMANN.—A motor-driven centrifugal pump which is so small that it can be lowered into a drilled hole of customary diameter, about 8 in., has been devised. The 6½-kw. three-phase motor represents a special design, having a rotor whose length is fourteen times its diameter. The stator has a two-pole winding which gives the motor, at 50 cycles, a speed of 3,000 r.p.m. Although great care has been taken to make the insulation of the motor as water resistant as

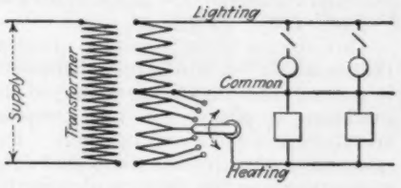
possible, a small amount of leakage is unavoidable at the two stuffing boxes above and below the armature. A small auxiliary bilge pump is therefore provided, which is driven from the main motor by a liquid coupling. When the bottom sump has been filled by a sufficient amount of leakage water or oil this clutch coupling will be submerged and will drive the bilge pump. The three leads to the motor are inclosed in a steel-tube conduit, which is furnished in certain unit lengths. The joint between adjacent lengths is a combination of a separable three-pole plug and an absolutely tight union. No details are given of the pump itself, since any type of narrow-built multistage design can be used.—*Siemens-Zeitschrift*, July, 1927.

Heat Applications and Material Handling

Heat Treatment Adding Steadily to Effective Service of Steel and Non-Ferrous Metals.—The general subject of heat treatment of metals has been covered in a summary to which sixteen prominent engineers and executives have contributed brief statements of the desirable characteristics obtained and requirements of processes involved in the satisfactory accomplishment of heat treating. The probable lines of future progress, the application to various types of castings and to case-hardening, the laboratory aspects, welding features and the applications to alloys are considered. F. W. Brooke points out the value of electricity for heat and its wide application to treating metals. The processes and industries in which electric heating has been notably successful are pointed out. It is stated that the outstanding need of the electric furnace industry today is the development of a heating unit that will bring the electric furnace into the higher range of temperatures, particularly the forging temperatures from 1,900 deg. to 2,300 deg. F. The automobile industry is credited with leading the field, and it is asserted that considerable development work has been done and furnaces have been installed and are operating for heating steels to forging temperatures. The non-metallic type of heating unit is favored for these ranges. For temperature applications requiring less than 1,800 deg. F. the use of metallic heating units is recommended, and it is stated that where the design and application have been taken care of by properly experienced engineers the life of the metallic heating unit in this temperature range is practically unlimited.—*Iron Age*, Sept. 8, 1927.

Miscellaneous

Wilkinson "Change Circuit."—H. M. Sayers.—A suggestion for giving practical effect to a plan for filling up the valleys of domestic demand by the inclusion of a stored water-heating load, to be varied inversely with the other domestic load, has previously been advocated by Wilkinson. A modification of this plan is offered here. The lighting load in this discussion includes lighting, cooking and appliance use other than that included under the head of heating or the storage of heat in water containers permanently connected to the supply line and constituting, for any particular distributor, a load of approximately constant ohmic resistance. The author has endeavored to point out a certain lack of desirable features in the earlier plan, reducing the problem to minimum capital cost consideration and the devising of simplified apparatus. The substitution for the induction regulator transformer required in the Wilkinson scheme of an ordinary transformer with taps on the secondary in steps of 10 per cent is suggested. The windings from the tapping point and the common lead must carry the sum of the heating and lighting load. A transformer of one and a half times the output capacity of the heating transformer should be sufficient for the two loads. The adaptation of the plan to three-phase wiring may be arranged so that the lighting and heating loads are divided between the two outside wires and have a common middle wire that serves as a three-wire main for both. Wiring diagrams are offered in several different arrangements based upon the considerations indicated in the accompanying figure.—*Electrician (England)*, Aug. 19, 1927.



MODIFIED CHANGE CIRCUIT AS SUGGESTED BY SAYERS

Electrophysics, Electrochemistry and Batteries

Almeida "Neutral System" Accumulators.—This article, for which the editors specifically disclaim responsibility as regards the validity of the statements quoted, presents two opposing views of a new Spanish storage battery for which remarkable properties have been claimed. A British company has been formed with a capital of $170,000 in connection with the promotion of this product. *La Energia Electrica* is quoted in connection with the discovery and development by Almeida of a new type of electrical accumulator. The characteristic feature is that in place of the usual acid or alkali, a solution of zinc chloride and other neutral salts is used. The negative plate is entirely metallic, without covering of any kind. The positive is formed of an unattackable conductor with which is incorporated a small percentage of silver so finely divided that it assumes a spongy character and acts as a catalyzer. Among the advantages claimed for the new type of accumulator is a capacity ten times greater than that of a commercial battery of equal weight. Tests are said to have shown that it is capable of giving on discharge nearly 100 per cent of the charge, the output of energy being approximately 93 per cent. When not in use there is said to be no spontaneous discharge. The voltage is 2.2 and the cell may be quickly charged and discharged, even by short-circuiting, without danger of damage. No forming period is necessary, it being possible to charge a new battery as soon as it is completed. The weight of the cell is but one-sixth of that of the usual type. An Almeida accumulator weighs but 4.4 lb., occupies a volume of 91½ cu.in. and is said to be able to deliver 100 amp. for one hour or 10 amp. for ten hours. Spanish, German and French interests are said to have given their approval and support to the proposition. The *Elektrotechnische Zeitschrift* states that the accumulator has a positive electrode of carbon or graphite with an addition of silver, a negative plate of zinc and as electrolyte a mixture of zinc bromide and zinc chloride. Exhaustive tests extending for about six months are said by this publication to have led the German interests previously lending their support to the work to come to a decision not to proceed further with additional tests and to reach the conclusion that no economical results can be secured. It is here stated that the Almeida battery, in relation to its weight, has greatly reduced utilizable storage capabilities as compared with acid and alkaline accumulators encountered in standard practice. The life of the battery is said to be short. The bromine and chlorine vapors given off are injurious to health. The Accumulatoren Fabrik Gesellschaft is said to have informed Almeida that as soon as he should overcome the difficulties with regard to output capacity and the emission of vapors dangerous to health it was prepared to go further into the matter. A number of prominent industrial men are named as directors of the British company, and an international organization devoted to Almeida interests is referred to as having obtained the patent rights for North America, Great Britain, Canada and Italy.—*Electrical Review (England)*, Aug. 26, 1927.

Traction

Storage-Battery Trucks.—L. Krieger.—Data given in this paper indicate that the over-all economy of storage-battery-operated trucks is higher than that of gasoline trucks. Tests on a large and practical scale have established 100 watt-hours as the power requirement of a modern electric truck per ton-mile. Comparative investment and operating costs are given for 3-ton trucks, covering per day an average of 31 miles. With an average cost of off-peak night current, the electric truck is about 33 per cent less expensive operatively than the gas car. Three tabulations, with cost and maintenance data compiled from practical road tests, contain detailed items, comparing the performance of gasoline and electric storage battery trucks of 3 tons capacity.—*Revue Générale de l'Electricité*, July 9, 1927.

Book Reviews

Steam and Gas Turbines

With a Supplement on the Prospects of the Thermal Prime Mover. By Dr. A. Stodola. Translation of the sixth German edition by Dr. L. C. Loewenstein. New York: McGraw-Hill Book Company, Inc. 2 vols., 1,356 pages, illustrated.

This masterpiece in engineering literature has been made available in English through the authorized translation of Dr. Loewenstein. It is all-embracing in its discussion of steam and gas turbines, and no other book approaches it in thoroughness, completeness and clear presentation. With a world-wide perspective, the author and the translator have placed theory, practice, detail and imaginative delvings into the future between the covers. It is a complete treatise on steam and gas thermal theory; it shows in detail the design and the design elements of all steam and gas turbines; it covers governors, oil coolers, foundations, operating troubles, bearings, blading and a host of other details; it discusses and describes jets, centrifugal compressors, extraction turbines, low-pressure turbines and mixed-pressure turbines; it uses both simple and complicated mathematics and theory and includes many useful new and well-drawn graphs and charts; it has a human and historical touch which affords a background to the development of the art; in fact, it is the result of a lifetime of work and study.

It may be granted that few engineers will use the whole book and that college students cannot master it in a few months' study. This fact has been recognized by the translator, and a judicious use of large and small type helps orient the major and minor topics for the reader. But within the pages there will be found material on any aspect of the subject, and this is what makes the book stand out pre-eminently in engineering literature.

In the first volume the author treats of fundamental thermodynamics, the flow of elastic fluids, flow in channels and buckets, the conversion of energy in steam turbines, radial turbines, axial turbines and general relations. He then discusses the construction of turbines and the different types of turbines found in all parts of the world. In the second volume the marine turbine is discussed, as are turbines for special purposes, including low-pressure, mixed-pressure, extraction, back-pressure and accumulators. An especially good treatment of turbine governors and governing is included. Under the subject of condensation some splendid material is given on the general topic, on pumps, jets, drives for pumps and on turbine foundations. Under the head of operating experience are given much practical experience with turbines and details of failures. A splendid chapter is included on special problems encountered in turbine design. These include thermodynamic problems and problems in strength of materials and even delve into general energy relations. The gas turbine is treated thoroughly, and to conclude the book the prospects of the thermal prime mover are discussed in a thorough and imaginative manner.

The translator and the publisher should be thanked for making this monumental work available in English for American engineers and students.

Dielectric Phenomena: Electrical Discharges in Gases

By S. Whitehead. New York: D. Van Nostrand Company. 174 pages, illustrated. Price, $4.

This volume gives a résumé of material available on discharge phenomena in gases. The author has surveyed the literature carefully and has compiled and discussed facts and opinions. Despite vague theories and disjointed data, much progress has been made on this important topic. The chief phenomena observed in discharges through gases at pressures for which the mean free path is short compared with electrode dimensions are discussed, and data and theories are assembled and treated in a critical manner. The ionic theory of gaseous conduction, sparkover, corona, including glow, dark and brush discharges are major topics. Good experimental data and quantitative treatments of certain phenomena add to the value of the book.

Elektromaschinenbau

By P. B. Arthur Linker. Berlin: Julius Springer. 304 pages, 128 diagrams, 14 inserted charts.

A theoretical treatise on the design of the whole range of electrical machinery from direct-current generator through transformers and induction motors to cascade converters and polyphase commutator motors in 304 pages, including a table of symbols and an index, is necessarily compact. The author wastes no space on purely descriptive matter, nor is there room for illustrative problems. Treating design as essentially a matter of step-by-step computation, the discussion takes the form largely of equations and the derivation of formulas. The latter are worked out rationally in mathematically simple language. The 128 diagrams are clear and sufficiently large. Constants or factors resting on experience, and they are quite numerous, are accompanied by indications of their numerical values in current practice. Conciseness is not secured by sacrificing important details where these affect the theory of operation; thus there is included the computation of mechanical stress on coils due to short-circuits and of the magnitude of the voltage ripple on the direct side of a converter, also discussions on avoidance of objectionable currents in shafts and bearings and of magnetic howling. Computations are outlined for bearing and shaft sizes, including the effects of span, supported weights and magnetic pull due to eccentricity, and for critical speed in high-speed machines.

Fourteen forms, in a cover pocket, facilitate systematic procedure in the design of various types. This looks like a most helpful feature. Additional sheets are obtainable separately. The book should prove of interest to designers and teachers of electrical engineering, though the treatment is probably too solid for the average run of students.

Book Notes

FEDERAL AND STATE LAWS RELATING TO WEIGHTS AND MEASURES. Washington, D. C.: Bureau of Standards, United States Department of Commerce. 976 pages. Price, $2.30.

This book has been revised to present the existing laws of the federal government and of the states, territories and insular possessions of the United States. It is the only publication in the field and includes federal laws and regulations relating to fundamental standards such as legal rules for the measurement of flowing water, for marking the net quantity on package goods and for standards and units of weights and measures. The scope of the laws contained in this compilation and the wide application which weights and measures have, in general, to the conduct of business make it a very valuable reference work and guide in a large number of different lines of business. Copies may be obtained from the Superintendent of Documents, Government Printing Office, Washington, D. C.

JAHRESBERICHT DER VERKEHRSDIREKTION, 1926. Berlin: Berliner Städtische Elektrizitätswerke A. G. 122 pages, 84 illustrations.

If there is anything in the way of statistics, except those of a financial nature, omitted from this unusually detailed report of an operating company, careful examination has failed to reveal it. Regarding capitalization and earnings, generally given the place of honor in an American report, there is not a word. Otherwise there appears to be scarcely a question that might reasonably be asked to which the answer cannot be found, whether relating to data on growth, installed capacity, loads, load curves, number of customers, rates, or to advertising, sales methods and relations with contractors.

Books Received

Lehrbuch der Praktischen Physik. By Friedrick Kohbraush. Leipzig: B. G. Teubner. 832 pages, illustrated.

Theory of Thermionic Vacuum Tube Circuits. By Leo J. Peters. New York: McGraw-Hill Book Company, Inc. 256 pages, illustrated. Price, $3.

Principles of Radio Communication. By John H. Morecroft. New York: John Wiley & Sons, Inc. 1,001 pages, illustrated.

Engineering Problems Manual. By Forest C. Dana and Elmer H. Willmarth, New York: McGraw-Hill Book Company, Inc. 184 pages, illustrated. Price, $2.

News of the Industry

Dr. Felix Deutsch, Head of A.E.G., in New York

Dr. Felix Deutsch of Berlin, head of the Allgemeine Elektrizitäts-Gesellschaft and a Privy Counselor of Defense for Germany, has just arrived in New York, on a visit of pleasure and to inspect American plants. Newspaper rumors predicting world-market agreements between the great German manufacturing company and the General Electric Company, based on Dr. Deutsch's journey and on recent visits of General Electric officials to Berlin, were denied by A.E.G. officials, who said: "Both visits mean simply an exchange of courtesies. Relations between the two companies are most friendly and increasingly satisfactory as regards exchange of patents and methods. No new arrangements are being considered." Dr. Deutsch was the guest of honor at a dinner given by Otto H. Kahn on Tuesday night at his home in New York City, which was attended by about sixty men, including leaders of American industry.

World Engineering Congress for Tokyo in 1929

Plans are under way to organize throughout the world national committees to arrange for participation in the World Engineering Congress to be held in Tokyo in October, 1929. This congress is sponsored by the Japanese government, which has made a liberal grant in its support. International co-operation and mutual understanding of engineers are to be promoted by it, with discussions of engineering as a profession, engineering and scientific education and cognate topics. Baron Shiba, director of aërodynamic research for the Japanese government, is now in this country arranging for American participation. Secretary Hoover and the engineering bureaus at Washington are giving the undertaking encouragement, and Elmer A. Sperry has accepted the chairmanship of the preliminary American committee.

Buffalo General Electric to Add 75,000-Kw. Unit

William R. Huntley, president of the Buffalo General Electric Company, has just announced that another large turbo-generator and the additional boiler capacity to supply it will be installed at the Charles R. Huntley steam-electric station, on the River Road north of the City Line. This addition is designed to meet the steadily increasing demands for power not only in the Buffalo General Electric Company's territory but also throughout the entire Buffalo, Niagara & Eastern system, for which the Huntley station is the largest steam-power unit. The new turbo-generator will be a unit of 75,000 kw. rating. Four boilers burning powdered coal will be added to the equipment. The new unit, which will add approximately 50 per cent to the present capacity of the station, will, it is planned, be ready for service in the fall of 1928. Ground already has been broken for the extension of building foundations.

It is only a year since the Buffalo General Electric put into service a new 60,000-kw. unit, together with four new boilers, all among the largest of their type installed up to that time. The boiler plant was designed by Chief Engineer H. M. Cushing and his staff in the Buffalo General Electric offices.

After the St. Louis Tornado

Power Companies Restore Service in Five Days to All Customers Ready for It—Venice (Ill.) Station Wrecked—Effect on Union Electric's Load

BY TUESDAY, Oct. 4, less than one week from the time the tornado which killed 80 persons, injured 1,286 others and did general property damage estimated at $25,000,000 struck St. Louis, Mo., and Venice, Granite City and Madison, Ill., the Union Electric Light & Power Company, the Laclede Power & Light Company and the Illinois Power & Light Corporation had restored service to all customers except in the districts hardest hit, where many of the companies' patrons will not be ready to resume the use of energy for weeks to come. The power companies probably suffered a combined loss of about $1,000,000. Of this sum about $250,000 was caused by damage to the Venice (Ill.) power plant, recently taken over from the Illinois Power & Light by the Union Electric; to the adjoining substation of the East St. Louis Light & Power Company and the Illinois Power & Light, and to the transmission line connecting Cahokia with the Venice station.

The Venice plant was not in operation at the hour when the storm struck, tearing off a portion of the roof, knocking down two end walls and thus causing débris to fall on turbines, rotaries and other equipment. None of the twenty-eight workers in the plant was injured. In St. Louis about 50 to 75 pole miles of line, or from 500 to 600 miles of wire, was affected by the storm, which burst over about 5 square miles out of the city's total area of 64 square miles. None of the Union company's substations was damaged, but scores of poles were snapped off or blown down. In some portions of the storm zone the main cables were under ground in conduits, and these were not affected by the tornado, which from an electric company's standpoint was the most disastrous in the history of the city. It far surpassed in actual loss the great storm of May 27, 1896, which killed about 350 persons in St. Louis and East St. Louis, Ill., because thirty-one years ago electricity for residential lighting and industrial power purposes was not in general use.

As the storm passed on Thursday, Sept. 29, every available repairman was hurried to the district, while engineers and others from the power plants and general offices with ability to help in the work were put to work at once. All realized that the supreme test of the efficiency of their organizations was at hand, and throughout the night they labored unceasingly. Immediately after the storm struck about 120,000 of the 200,000 customers of the Union company were cut off from service, but by 3 a.m. on Friday service had been restored to 80,000 patrons. The Laclede company also made good time in restoring service to the majority of the 14,000 customers of that company affected. The hospitals, emergency relief stations and public institutions were served first by both the Union and the Laclede, and in twelve or fourteen hours after the tornado struck they had restored service to all such consumers within the devastated area.

Damage in Illinois

When the storm struck, the Illinois Power & Light was using a peak of 26,000 kw., about half of which came from the Cahokia plant of the Union Electric and the remainder from the plants at Grand Tower and Muddy, Ill., belonging to the Public Service Company of Central Illinois. The tornado completely wrecked the substation in Venice and tore down part of the high-tension line from Cahokia. Almost immediately the other Illinois Power & Light substations in districts cut off from Venice were able to get service from the Grand Tower plant and the Illinois Power & Light station in Vandalia. By 3 p.m. service was restored to many centers, and by midnight energy was going into substations in all towns served by the Illinois Power & Light. This company suffered no appreciable

loss in consumption as a result of the storm. The Union Electric forces did great work in getting a 7,500-kw. turbine at the Venice station cleared and ready to furnish power at 9 p.m. The Illinois Power & Light brought in crews from all points in southern Illinois, and an emergency pole line was stretched to tie up again with Cahokia so as to be ready for large industrial users at 7 a.m. Friday. The Illinois Power & Light had been tied in with the Cahokia plant on Sept. 17, and this connection proved very valuable in the emergency, as the river line from Cahokia was not damaged except in the vicinity of the Venice plant.

The United Railways Company of St. Louis probably suffered a loss of about $600,000. A dozen main trolley lines were in the storm district. Trolley lines for the Illinois Traction system were restrung, poles restored to service and interurban trains were brought into St. Louis by 5.30 p.m. Friday. The Southwestern Bell Telephone Company reported 14,900 telephones out of commission Thursday night. Its loss will probably reach $500,000.

Loss of Load

The Union Electric Light & Power Company experienced a load loss of 50,000 kw. immediately after the storm struck. On Sept. 23 it sent out 3,032,786 kw.-hr and on Sept. 30, the day after the storm, only 2,522,650 kw.-hr., or a loss of 16 per cent.

Engineers Work for Economy

Engineering National Section, N.E.L.A., Meets to Discuss Plans—Broader Views on System Development Needed—Greater Return from Investment Advocated

MORE than four hundred members of the Engineering National Section, N.E.L.A., met in Chicago this week. The committees discussed plans for the year and acted upon reports prepared during the summer. Chairman E. C. Stone stressed the need for engineers to broaden their point of view and to aid the industry to get a greater return from investment. The magnitude and complexity of utility systems have become so great that it is necessary, he said, to study and plan carefully when contemplating any addition to system structures if the greatest economy in new construction is to be had. He outlined the growth in system investment and the need for greater returns. Much of the increased investment had been occasioned by meeting higher service standards, and engineers should co-operate in getting greater load density to compensate for these larger investments per customer.

E. W. Lloyd, addressing the apparatus committee, outlined the relations of engineers to commercial developments. He thought that utility systems should be built on the basis of the load served and the energy sold, pointing out that continuous service was essential but that the cost of this standard of service had become very great. Customers are entitled to greater consideration as regards the cost of service connections, and, in addition, the cost of tapping lines for small customers set up a serious handicap to getting new business. In the opinion of Mr. Lloyd millions of kilowatt-hours can be sold existing customers, and the next big task is to consolidate the energy produced by the larger industrial customers with that produced by the light and power companies. In this activity the engineers should co-operate with the commercial men.

Major H. S. Bennion gave an address on the Boulder Dam project, reviewing the whole subject and outlining the advantages and disadvantages of the proposals. He urged that before jumping into this huge project the federal government should call for a further study, preferably by engineers outside the Reclamation Service, so as to get a fresh viewpoint. This work would be simplified if flood control were divorced from the other questions presented.

Many industry engineering problems were discussed at the committee meetings. Fundamental plans for system layouts, specifications for equipment, suggestions for research, surveys of practice in power houses and other topics were brought before the meetings. The committees have been active in bringing about agreements on these important problems. The consensus of opinion of the engineers was that need existed for reducing investment costs and for getting greater returns from existing investments.

Another "Superpower" Link Goes In

Completion of Appalachian Line from Kingsport, Tenn., to Saltville, Va., Adds Another Circuit to Great Interconnected Area Near Atlantic Coast

COMPLETION last week of a 132-kv. transmission line between Kingsport, Tenn., and Saltville, Va., by the Appalachian Electric Power Company, subsidiary of the American Gas & Electric Company, closed the last gap in a second circuit in the great network of power lines that now ties the Northern and Southern Atlantic Coast States together. The new circuit follows the Raleigh-Roanoke interconnection described in the Electrical World for Sept. 10, page 525. A two-sided trunk line, of which the right-angled sides are each approximately 1,000 miles in length, now has come into being, with Chicago as the western end and Boston and Pensacola, Fla., as the eastern and southern termini.

International Conference on Radiotelegraphy

Four Hundred Delegates from Seventy Nations in Five Continents Listen to Addresses by President Coolidge and Secretary Hoover

WITH 400 delegates in attendance, representing 70 nations and 41 communication companies, the International Radiotelegraphic Conference of 1927 held its opening session at Washington on Tuesday of this week in the presence of a distinguished gathering, including President Coolidge, Secretaries Kellogg and Hoover, Attorney General Sargent and members of the diplomatic corps.

Speeches by President Coolidge and Secretary Hoover, in which they stressed the need for enlargement of the scope of the existing radio convention adopted at London in 1912 to deal only with marine transmission and in which they gave assurances that the United States would be willing to make concessions to its sister powers to speed the development of radio, were vigorously applauded.

The fundamental purposes of the conference, as described by Mr. Hoover, are "to arrive at such modifications as may be necessary in our existing international treaties to promote the wider use, reduce the conflicts and stimulate the further progress of radio in international communications."

President Coolidge declared that the nations must not permit the radio to be used as an agency to create ill will and dissension. "In many fields," he said, "our country claims the right to be the master of its own independent development. It cordially concedes the same right to all others. But in the radio field the most complete development, both at home and abroad, lies in mutual concession and co-operation. Your main endeavor will be to discover the rules which will be for the mutual advantage of all those who are connected with this great industry and who are the users of this means of communication."

Mr. Hoover, who is presiding over the conference, discussed, but without expressing a personal viewpoint, the proposal to merge the convention of St. Petersburg, dealing with international telegraph service, with the international radio convention. Touching upon the question of government as opposed to private radio control, he expressed his pleasure that "it was possible to extend invitations to attend this conference to the great companies which have so largely contributed to the creation, growth and high efficiency of radio service," and indicated that this country, where the principle of government radio control was recognized, would insist on protection of private interests.

Among the foreign delegates to the conference, who in most cases are themselves high government officials directly concerned in the regulation of communication service is Guglielmo Marconi of Italy.

New Appointments in Bureau of Standards

The appointment, as reported last week, of Roy M. Hudson as assistant director of the Bureau of Standards in charge of commercial standards was accompanied by that of Dr. L. J. Briggs as assistant director in charge of research and testing. These new offices were announced on Sept. 30 by the director, Dr. George K. Burgess. By them the bureau's activities will be divided into two main groups.

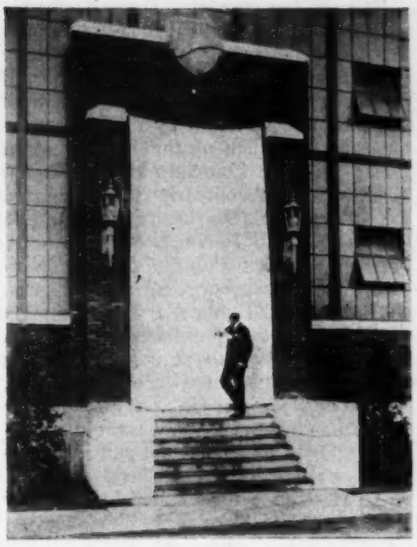
The first, under the immediate supervision of Dr. Briggs, will include all the bureau's scientific research and testing, the development, construction, custody and maintenance of reference and working standards and their intercomparison, improvement and application in science, engineering, industry and commerce. Dr. Briggs will act as executive head of the bureau when the director is absent, in the management and supervision of administrative, scientific and technical work.

The second group, headed by Mr. Hudson, will include the supervision, direction, formulation and co-ordination of commercial standards, with particular reference to the needs of industry, involving the oversight of the division of simplified practice, division of commercial standards and part of the work of the division of building and housing relating to codes and standards.

Dr. Briggs, who was graduated from the Michigan Agricultural College in 1893, entered the Bureau of Standards as physicist by transfer from the Department of Agriculture on Jan. 1, 1920. Mr. Hudson, a graduate of the L. C. Smith College of Applied Science, Syracuse (N. Y.) University, before being called to the Department of Commerce in January, 1922, by Secretary Hoover, was for several years engaged in waste-elimination activities, and he has continued work along these lines in connection with the division of simplified practice.

Mad River Plant Dedicated by Ohio Edison

Marking the completion of two years of construction work and the dawn of a new era of electrification in the Mad River Valley, the two-million-dollar Mad River power plant of the Ohio Edison Company of Springfield was dedicated on Oct. 2 with a public ceremony in which several thousand persons from that Ohio City and many other communities served by the company participated. A bottle containing water which had been gathered from the 42 cities and towns served by the company was used by C. I. Weaver, vice-president and general manager, to "christen" the plant before he threw open the doors and invited the public in to inspect it. A check maintained by guides revealed that more than five thousand persons passed through on the opening day. It was planned to keep the plant open for inspection all week.



VICE-PRESIDENT WEAVER DEDICATES PLANT

The new plant, an exterior view of which appeared in the ELECTRICAL WORLD for Aug. 20 (page 375), contains a General Electric 20,000-kw. turbo-generator as the initial unit and is so designed that additions can be built at any time to triple its capacity. The company has announced that the old Rockway plant, which has supplied electric power and heat for Springfield for a score of years, will be retained for emergency use and also as a steam-heating unit. A. A. Cummins of Jackson, Mich., was resident engineer in direct charge of construction.

New Officers of Edison Company Association

Besides electing H. P. Liversidge of the Philadelphia Electric Company to be president for the coming year, as reported in the ELECTRICAL WORLD for Oct. 1, the Association of Edison Illuminating Companies at its Colorado Springs convention last week elected P. S. Arkwright of the Georgia Power Company as vice-president and E. J. Doyle of the Commonwealth Edison Company as treasurer. P. S. Millar of the Electrical Testing Laboratories, New York, was again made secretary. The new executive committee will contain Charles L. Edgar of Boston, W. W. Freeman of Cincinnati, J. J. O'Brien of Chicago, Samuel Insull of Chicago and J. W. Lieb of New York.

Denver Conference Adjourns for a Month

Negotiations Between Lower-Basin States Will Go on, and Hope of Eventual Agreement Based on Boulder Dam Development Is Still Entertained

PERSISTENCE is still the watchword at Denver, where the conference of governors, senators, representatives and other delegates from the seven states concerned in solving the "Colorado River problem" has gone on from day to day, now in open and now in secret session, now in admitted deadlock and again with confident hailings of a visioned answer. With no definite progress to report for the long session, the conference adjourned on Tuesday, Oct. 4, after setting Nov. 7 as the day for reconvening, with Denver again as the meeting place.

While the question of the division of the water of the river is yet to be settled, the question of division of the power from the proposed hydro-electric plant at Boulder Dam was the basic reason for the conference split. California steadily declined to grant the demands made by Arizona and Nevada. These two states have been asking for one mill per kilowatt-hour, which would make a total of $3,600,000 annual revenue to be divided between them. W. B. Mathews, one of the California Colorado River Commission and special counsel for the Los Angeles Bureau of Power and Light, made a report in which he stated that four-tenths of a mill per kilowatt-hour was the maximum amount which could be allowed for state revenue in view of the steadily decreasing cost of steam-power generation. At this figure Arizona and Nevada would receive $1,400,000 between them instead of $3,600,000.

Before adjourning, the conference passed the state-rights resolution by Senator Pittman of Nevada implying the prior claim of that state and Arizona to power developed on their territory. Six states voted for the resolution, California not voting. Arizona and Nevada are said to have submitted to California four alternative suggestions for a settlement of all pending issues.

It is hoped that before the conference meets again in November Arizona, Nevada and California will have come to some working agreement as to the allocation of both water and power. All delegates expect to use the intervening time to consult with advisers and experts. The California representatives will discuss with Secretary Hoover and Secretary Work the Arizona-Nevada demand for revenue from the power that would be generated on the government's river project. The diplomatic efforts of Senator Pittman, Senator Hayden of Arizona and other political leaders are also expected to bear fruit.

Speaking before the annual convention of the American Federation of Labor, meeting in Los Angeles Oct. 4, Senator Hiram Johnson urged organized labor to lend its aid in the enactment of legislation that would result in the building of Boulder Canyon Dam.

Purchases and Mergers

Springfield Company Joins Western Massachusetts Group — Consolidation of Western New York Utilities with N., L. & O. Sought

AS FORECAST on Sept. 3 (page 476), the United Electric Light Company, Springfield, Mass., has been taken into the Western Massachusetts Companies, a holding organization for power and light utility companies. Final negotiations were concluded last week with the transfer of 51 per cent of United stock to the holding company. With the advent of the United into the fold the capitalization of the power and light companies involved becomes collectively about $50,000,000. They were listed in the previous item just referred to.

Joint petition was filed with the New York Public Service Commission last week by the Niagara, Lockport & Ontario Power Company and the Western New York Utilities Company, Inc., the latter serving Batavia, Albion, Medina, Brockport and various towns in Erie, Genesee, Monroe, Niagara, Orleans and Wyoming Counties, for permission to consolidate into a single corporation under the name of the Niagara, Lockport & Ontario Power Company. The outstanding common stock of the two companies is now owned by the Buffalo, Niagara & Eastern Power Corporation.

The New York Public Service Commission has given its consent to the Eastern New York Utilities Corporation to transfer its franchises, works and system in Rensselaer and Columbia Counties, consisting of electric and gas properties, to the Municipal Gas Company of Albany. This is a preliminary step in the consolidation of the Municipal Gas Company and other companies into the New York Power Corporation, as already reported.

A petition for sale of the municipal electric light and power plant at Osgood, Ind., to the Hoosier Public Utility Company of Greensburg for $65,000 has been approved by the Indiana Public Service Commission.

I. C. Elston, Jr., representing Chicago utilities, has made an offer of $25,000 for the Worthington (Minn.) municipal electric power and light system and dam.

The Cogswell (N. D.) Light & Power Company has been sold to the Otter Tail Power Company, as has also the property of the Richland County Farmers' Co-operative Electric Company, in the same state.

Claflin, Kan., has turned over to the United Power & Light Corporation, Abilene, all properties connected with the operation of the municipal light and power system. The company had been making annual payments to the city toward purchase of the system, including taxes amounting to about $2,000. The Kansas Supreme Court having ruled that the company is not liable for the taxes, the city has given the company title to the properties and has accepted a mortgage for the balance due.

Sale of two groups of small electric plants to the Insull interests by the Dierks Lumber Company, previously alluded to in these columns as reported or under way, has been confirmed with some change in detail by the announcement at the office of the Southwestern Gas & Electric Company at Texarkana, Ark., that that company has purchased the plants at Dierks, Foreman, De Queen, Mineral Springs, Murfreesboro, Hatfield, Center Point, Gillham, Winthrop and Lockesburg, all in Arkansas. The associated Public Service Company of Oklahoma has purchased the Dierks plants in that state at Idabel, Broken Bow, Valliant, Pine Valley, Talihina, Albion and Wright City. The purchase price was not given out in either instance, but it will no doubt run into several hundred thousand dollars.

An election will be called by the City Commission of Harlingen, Tex., to vote on selling the municipal electric light and power plant to the Central Power & Light Company for $1,250,000.

The acquisition of control of public utilities in Brazil, Colombia, France, Japan and other foreign countries at a cost of $36,417,597 by the Electric Bond & Share Company and a proposal of their transfer to the American & Foreign Power Company, Inc., an associated concern, is reported under "Financial and Statistical" (page 761).

California Commercial Men Are for Load Building

Central-station commercial men have been accorded full executive recognition and support, and it is now their part to "get busy and do the selling job," declared R. H. Ballard, executive vice-president and general manager of the Southern California Edison Company, in a forceful address before a gathering of 150 commercial men of the Pacific Coast Electrical Association at their first conclave of the year, held in Los Angeles, Sept. 22 and 23. Mr. Ballard said that there had not been the necessary concentration on load building. The power companies cannot do the job alone, but must have the hearty co-operation of manufacturers, jobbers, contractor-dealers and all retail outlets.

This same thought of improving trade relations, particularly with the contractor-dealer, was dominant in the merchandising committee meetings, and one of the major activities planned for this committee is to find out what the problems of the average contractor-dealer really are and help him to solve them. Two constructive pieces of work are planned by the electric range committee —to find out just why it costs so much to "wire in" a range and why the costs in different sections of the country vary so widely and then to take steps to get the cost down to a more reasonable figure. A second activity is a selling campaign to get more ranges into the homes of men in the electrical industry. Special discounts and terms will be given.

The lighting committee will select five cities and towns in California and, through a local civic body in each, make available to one prominent store $300 toward defraying the cost of a proper window-lighting installation. Selection of the store will be made by a drawing. The data gathered will then be used as a basis for convincing other stores in the same city. The educational lighting committee will tell the story of better lighting in the school and in the home through 18 speakers in 27 cities and towns during November. During December 1,500,000 folders will be distributed. Through the industrial-heating committee data will be gathered to show available industrial-heating business, and the kilowatt-hours which each industrial plant would use if completely electrified will be computed.

Judge Charles W. Appleton, vice-president of the General Electric Company, showed the wonderful opportunity for load building that lies before the commercial men of the industry.

Western Inspectors Meet at Toronto Internationally

Electrical men from many points in the United States and Canada gathered in Toronto from Sept. 27 to 29, inclusive, for the twenty-third annual meeting of the International Association of Electrical Inspectors, Western Section. The business sessions were well attended, and keen interest was displayed in the various papers, which were mainly technical in nature. Public interest centered in the convention luncheon, which was held in the King Edward Hotel on the opening day, the principal speakers being F. A. Gaby, chief engineer of the Ontario Hydro-Electric Power Commission, who talked about that organization; E. M. Ashworth, general manager of the Toronto Hydro-Electric system, and John B. Laidlaw of Toronto.

The progress of the standardization of practice in electric wiring, the development of a new Canadian code and uniformity of wiring rules and regulations in Canada were outlined by W. P. Dobson, chief testing engineer of the Ontario Hydro-Electric Power Commission, and also chairman of the committee on electrical codes, Canadian Engineering Standards Committee. His paper was the first published record of the various steps of the work. Following his outline, Mr. Dobson said: "The first step toward uniformity has thus been taken. It is expected that the code will be adopted by provincial and municipal inspection authorities throughout the country, and it is hoped that it is comprehensive enough to make local rules unnecessary. The future of the code in Canada will depend upon the extent to which it is adapted by inspection authorities. It is hoped that it will not be necessary to supplement it by local rules. This will depend upon the extent to which it is kept up to date. As the various committees are permanent, the machinery for revision is in existence, and it should be possible to keep it thoroughly up to date."

Progress of the A. G. & E.

Stanton Station Comes Into Commercial Operation — Appalachian Company Grows Rapidly—Philo Foundations Sunk—Important Interconnections

STANTON generating station, the modern high-pressure power house on the Susquehanna River in the Scranton (Pa.) coal-mining district, owned jointly by the American Gas & Electric Company and the Pennsylvania Power & Light Company, is just coming into commercial operation with the construction problems all worked out. This station is projected for at least 240,000 kw., and its units so far in operation have added approximately 90,000 kw. to the generating capacity of that territory. Apart from the ability to take on additional load, it will enable the company to discontinue the operation of some less efficient units with substantial economies resulting.

This is one of the items that make up a summary of recent progress by its subsidiaries and of construction under way by them that has just been issued by the American Gas & Electric Company. Other accomplishments, some of them already noted in these columns, include the installation of an additional turbine at Atlantic City, completed within the last two months. Another unit is due for shipment this fall for installation at that point, and these, together with the connection of transmission lines serving the systems in Delaware and Pennsylvania, will add about 40,000 kva. to the capacity of the south Jersey system.

The company's youngest operating subsidiary is the Appalachian Electric Power Company (covering almost all of Virginia west of Lynchburg and all the southwestern half of West Virginia), with its affiliated Kentucky & West Virginia Power Company. These properties have within the last six months added approximately 12,000 kw. of large power load, apart from the increases in other classes of business. The Kenova (W. Va.) generating station has been doubled in capacity by placing in service a new 25,000-kw. turbo-generator; a new 31,500-kw. generating unit has been installed at the Cabin Creek station, near Charleston, bringing the rating of that station up to 105,000 kw., and within the next 50 days a 25,000-kw. addition to the generating capacity at the Glenlyn power station will be put into operation, making the capacity of that plant 80,000 kw. The present hydro-electric generating capacity of the Appalachian Electric Power is only about 80,000 kw., but plans for the development of one of the sites available to the company are nearing completion, and actual construction may be expected to begin within a short time on a 100,000-hp. water-power plant.

For the new 165,000-kw. generating unit to be installed at the Philo plant of the Ohio Power Company 34 concrete caissons have been sunk to rock, about 52 ft. below ground level. All the steel columns for the superstructure will be supported by these caissons, and the erection of the columns will begin about Dec. 1. Progress on field work and the manufacture of machinery indicates that this turbine will be ready to take line load about Nov. 1, 1928.

The American Gas & Electric Company has also nearing completion a large-scale program for extension of transmission lines between stations and into new territory. Last year approximately 1,000 miles of transmission lines at 11,000 volts and above were added to its system, besides the addition of second circuits to existing 132-kv. steel-tower lines. The cutting in of the 132-kv. steel-tower line connecting with the transmission systems of the Carolina Power & Light Company, south of Danville, Va., and the Tennessee Electric Power Company, south of Kingsport, Tenn., is the most notable recent addition to transmission facilities.

This expansion of facilities for service in all its fields, the company says, necessitates the expenditure of approximately $2,500,000 a month in new capital, or more than $30,000,000 a year.

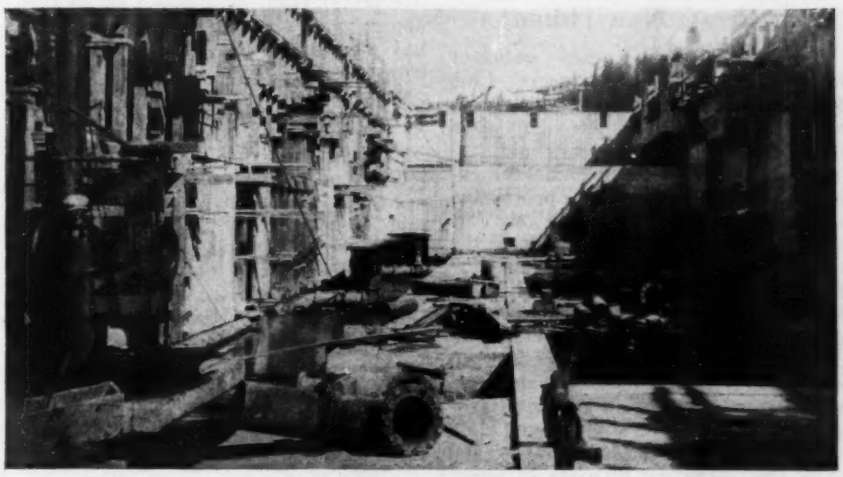
New Unit Goes on Line at Toronto (Ohio) Station

Turbo-generator unit No. 3 at the Toronto (Ohio) generating station of the Ohio River Edison Company, which is leased to the Pennsylvania-Ohio Power & Light Company, has had exhaustive trials and gone on the lines, and unit No. 4 will be in operation next year. Each of these machines is rated at 37,500 kva., and together they will double the capacity of the plant, being of the same type and size as the two that were first installed. These original units will now be taken out of service one at a time for inspection.

The building budget for the Penn-Ohio system for the current year called, according to a recent authorized statement, for the use of more than $6,000,000 of new capital, exclusive of the eight-million-dollar investment in doubling the capacity of the Toronto power station. One of its important features was the erection of a large transforming substation just west of Youngstown for the Pennsylvania-Ohio Power & Light Company. This station, now well on the way to completion, will rank in importance with the Boardman substation south of the city, with which it will be connected. The transmission line, to operate at 132 kv., has been built, the concrete foundations of the substation are in and the superstructure is being erected.

The new substation will be known as the Salt Springs station. It is at Salt Springs Road and Four Mile Run, where the company bought a five-acre plot. It will be of the most modern type of outdoor construction and will have an initial capacity of 15,000 kva., to be increased in two or three years to 37,500 kva. The new station will be the

Hydro-Electric Development at Grand Falls, N. B.



RAPID progress is now being made on the hydro-electric project of the St. John River Power Company, subsidiary of the International Paper Company, at Grand Falls, on the St. John River, in the Province of New Brunswick. The scheme of development at this site calls for an initial installation of 60,000 hp., in three units of 20,000 hp. each, and involves erection of a dam just above the falls and a tunnel 2,700 ft. in length and 24 ft. in diameter through the rock under the town of Grand Falls, from the upper basin to the lower basin.

With the added head obtained by the construction of the dam, the plant will operate under a head of 132 ft. To increase the natural low-water flow the company will construct a storage reservoir in the Temiscouata basin on the Madawaska River, a large tributary which rises in Quebec and flows into the St. John River at Edmundston. Part of the power to be generated is reserved for general sale within the province under a contract with the New Brunswick Electric Power Commission. The rest of the power available from the initial installation of 60,000 hp. has been sold to the Fraser Companies, Ltd., and the New Brunswick International Paper Company. The illustration shows the interior of the substructure.

control point on the Penn-Ohio system for interchange of power with the Ohio Public Service Company.

International Physical Congress at Como

Como, Italy, was the gathering place this year not only of the International Electrotechnical Commission, whose sessions at the nearby city of Bellagio have been reported in the ELECTRICAL WORLD, but of the International Physical Congress, which also was attracted to the beautiful lake district by the centenary of Volta's death. America, Austria, Denmark, France, Germany, Great Britain, Holland, India, Italy, Russia, Spain and Switzerland were represented at the physicists' gathering, at which four languages were spoken—English, French, German and Italian.

Among internationally known scientists who took part were Rutherford and Aston of England; von Laue, Franck, Gerlach, Stern, Sommerfeld and Born of Germany; Cabrera of Spain, Bohr of Denmark, Debye and Schrödinger of Switzerland, Cotton of France, Corbino, Majorana and Volterra of Italy; McLennan of Canada, and Langmuir, Millikan and Wood of the United States. Topics dealt with included radioactive atoms and rays, molecular dissociation, magnetic susceptibility of alkaline vapors, magnetic properties of palladium and platinum, sound waves of 300,000 cycles a second and cosmic rays.

San Francisco Engineers Dedicate New Home

The goal of many years' endeavor was reached by the Engineers' Club of San Francisco when its new home was dedicated on Sept. 30. This club, which is now fifteen years old, includes in its membership engineers engaged in all branches of the profession, the total membership being about 750. Because San Francisco is far from the headquarters of the national engineering societies the club has made a point of close relationship with these organizations. The four founder societies in conjunction with the club conduct an employment service in San Francisco, and thirteen branches of national technical societies hold meetings at the club.

The new quarters occupy the two top floors, fourteenth and fifteenth, of a new building at Pine and Sansome Streets. The space was arranged in the design of the building expressly to suit the needs of the club and great care was taken in the selection of furnishings and equipment. The completed plant is particularly well adapted to serve as the focal point for engineering society activities.

The address of dedication was made by President N. A. Bowers, Western editor *Engineering News-Record*. F. L. Lipman, president Wells Fargo Bank & Union Trust Company; Charles W. Merrill, metallurgical engineer, and Chester H. Rowell, former member of the California Railroad Commission, also made addresses.

Briefer News

CHARLESTON (S. C.) GENERATING STATION DOUBLES CAPACITY. — Tests have been made of a 10,000-kw. addition to the power plant of the South Carolina Power Company at Charleston, and the unit is now ready for service. The addition doubles the capacity of the power plant.

NASHVILLE EXTENDS ITS "WHITE WAY."— Newly installed lamps have extended the "white way" of Nashville, Tenn., along Broadway, and it now stretches from the river to Thirteenth Avenue and, together with a new lighting system on Memorial Square, does much to add to the attractiveness of the business district at night.

NEW SUBSTATIONS FOR MEMPHIS.— Two new substations for the Memphis Power & Light Company will be completed and put into operation this month. One of the stations is being built at Decatur Street and Lane Avenue. It will serve North Memphis. The other is being built in New South Memphis about half a mile beyond Nonconnah Subway. Each will cost about $300,000.

TEXAS CITY, TEX., TO HAVE POWER PLANT.—Formal notice has been given the County Commissioners of Galveston County by the Texas & Louisiana Power Company that it will construct an electric power plant at Texas City to cost approximately $400,000. The company has a franchise to build wooden-pole transmission lines throughout the county. It will serve a number of towns in that part of the Gulf Coast region.

EASTERN INSPECTORS' CONVENTION. —At the annual convention of the Eastern Association of Electrical Inspectors, to be held in the "mahogany room" of the Springfield (Mass.) Municipal buildings on Oct. 12 and 13, there will be a discussion of the National Electrical Code covering every section. Speakers from the article sub-committees of the National Fire Prevention Association's electrical committee will lead the discussions.

NEW 200-MILE TRANSMISSION LINE IN TEXAS OIL FIELDS.—More than 100 men are employed in constructing a high-tension transmission line for the West Texas Utilities Company from Cisco to Odessa, approximately 200 miles, with a loop back to San Angelo. The line will be connected with the Oil Belt Power Company plant at Eastland, as well as with the plants of the West Texas Utilities Company, and will be capable of carrying 132,000 volts, making it one of the major power lines in Texas. Right-of-way has been purchased across the land to be traversed by the line, and standard gates are to be erected at each fence line. Wooden poles, the shortest of which are 50 ft. in length, are being used to support the line.

POWER COMPANY'S ASSESSED VALUATION IS ALMOST TRIPLED.—The Mississippi River Power Company has filed notice in the District Court at Keokuk, Iowa, of its appeal from the assessment valuation of $6,000,000 fixed by the board of equalization, and it is understood that a petition will later be filed asking that the case be transferred to the federal court. The company's prior valuation was $2,019,100.

EXTENSIVE REVISION OF RATES IN NORTH DAKOTA.—New rates filed by various power companies for North Dakota towns and cities continue to be approved by the State Board of Railroad Commissioners in large numbers. The reductions are due in great part to the policy of the companies in purchasing small independent electric properties. In nearly all cases the new rates are lower than the ones that were previously in force.

OTTAWA AND HULL GO DARK.—For the first time in fifteen years the cities of Ottawa, Ontario, and Hull, Quebec, and surrounding municipalities were plunged into total darkness on the night of Sept. 30 by the breakdown of a generator in the power plant of the Ottawa & Hull Power Company. All services were tied up from half to three-quarters of an hour. The accident occurred with a generator which had been in service about twenty years.

SHAWINIGAN COMPANY TO INSTALL SEVENTH UNIT AT ST. MAURICE PLANT. —In order to provide additional capacity at Shawinigan Falls, Quebec, and to balance better its hydro-electric plants on the St. Maurice River, the Shawinigan Water & Power Company will immediately commence construction of the seventh unit in power house No. 2. This unit will be rated at 45,000 hp. and will be a duplicate of the last unit installed.

ACTION TO CURTAIL ACTIVITY OF JACKSONVILLE MUNICIPAL PLANT.—An injunction has been asked against the city of Jacksonville, Fla., to prevent its electric department installing wiring for stoves and water heaters on the ground that for the city to install wiring from the meters to the stoves or heaters would be to put the city in private business at the expense of the taxpayers. It is contended that the city is doing the wiring at less than cost on the theory that it will profit through the increased use of energy.

PUBLIC UTILITIES ADVERTISING ASSOCIATION ELECTS OFFICERS.—The Public Utilities Advertising Association has elected the following officers for the year 1927-28: President, Donald Mackie, Consumers Power Company, Jackson, Mich.; first vice-president, J. C. Barnes, New Orleans Public Service Company; second vice-president, L. D. Gibbs, Edi-

son Electric Illuminating Company of Boston; third vice-president, Dana Howard, Commonwealth Edison Company, Chicago; secretary, T. P. Pfieffer, advertising department, Byllesby Engineering & Management Corporation, Chicago.

INDUSTRIAL PLANT WILL SERVE KANSAS AND OKLAHOMA TERRITORY.—Construction of a power plant to be operated in conjunction with the Anthony (Kan.) Salt Company's works and to serve industrial consumers at Harper, Kingman, Attica, Medicine Lodge and other towns of southwest Kansas and Oklahoma has been begun by I. C. Bushong, Ottawa, Kan., head of the Municipal Power Transmission Company. Plans call for connection of the towns by a 33,000-volt transmission line.

TELLURIDE-DIXIE INTERCONNECTION PLAN FOR SOUTHERN UTAH.—Application of the Dixie Power Company and the Telluride Power Company, both operating in southern Utah, to interconnect their lines through the construction of a substation and a transmission line about 35 miles long has been filed with the Public Utilities Commission. The transmission line would extend from the Telluride company's lower Beaver station on the Beaver River, in Beaver County, to the northern terminus of the Dixie company's present transmission system at a point about 3 miles due west of Paragonah, in Iron County.

COLUMBUS MAYORALTY CANDIDATE DISCUSSES THE CITY'S ELECTRIC PLANT.—Promise of an engineering survey at Columbus, Ohio, to see whether the municipal plant can be expanded to furnish electric light and power to the city at a cost lower than the present rates of the Columbus Railway, Power & Light Company, is made by H. Sage Valentine, Democratic candidate for Mayor of that city. Growth of the municipal plant, Mr. Valentine charges, has been stunted for 25 years. "It has been added to, revamped, junked, restored, but mostly operated at low efficiency," he says, blaming politics.

LIGHTING TALKS TO BE GIVEN AT LUNCHEONS IN NORTHWEST.—With the committee personnel chosen, the speakers trained and the equipment procured, the home and industrial lighting committee of the Commercial Section of the Northwest Electric Light and Power Association has about completed arrangements for an extensive series of talks on lighting before business men's luncheon clubs. The tentative program for Utah, Idaho, Washington and Oregon includes five talks in Salt Lake City, three in Ogden, three in Boise, five in Spokane, two in Yakima, two in Walla Walla, five or six in Seattle, two in Everett, two in Bellingham, five or six in Portland, two in Salem, two in Albany and two in Eugene.

PUBLIC RECEPTION INAUGURATES NEW OFFICE BUILDING AT ELGIN, ILL.—The Western United Corporation formally opened a new office building on South Grove Avenue, Elgin, Ill., recently by a public reception. The building will be the home of the Western United and its subsidiaries, the Western United Gas & Electric Company and the Aurora, Elgin & Fox River Electric Company. It is 65 ft. x 100 ft., two stories high for the present, of ornamental-finish brick, stone and concrete, and will house 200 employees.

SUBSTANTIAL RATE REDUCTIONS FOR WEST VIRGINIA.—The Appalachian Electric Power Company has made application to the West Virginia Public Service Commission for approval of new tariffs which became effective Oct. 1. The reduction in the Bluefield district will amount to approximately $115,000, and in the whole territory served by the company the apparent reduction will be $600,000 annually. To the ordinary light customer the reduction will amount to 33⅓ per cent, the company says. Instead of 12 cents per kilowatt-hour for the first 15 kw.-hr. per month, the rate will be 8 cents, and for the next 85 kw.-hr. it will be 6 cents instead of 9.6 cents. Virtually all customers, both domestic and industrial, will materially benefit, General Manager Markle asserts, by the new rates, which bring West Virginia tariffs down to a level with those obtaining in Virginia.

Coming Meetings

[A complete directory of electrical associations, with their secretaries, is published in the first issue of each volume. For latest list see the ELECTRICAL WORLD for July 2, page 50.]

American Society of Mechanical Engineers—St. Louis, Oct. 10-13. C. W. Rice, 29 West 39th St., New York.

Illuminating Engineering Society—Edgewater Beach Hotel, Chicago, Oct. 11-14. L. H. Graves, 29 West 39th St., New York City.

Eastern Association of Electrical Inspectors—Springfield, Mass., Oct. 12-13. E. P. Slack, 85 John St., New York.

Southern Appalachian Power Conference—Chattanooga, Tenn., Oct. 13-15.

Rocky Mountain Division, N.E.L.A.—Broadmoor Hotel, Colorado Springs, Col., Oct. 17-20. O. A. Weller, 900 15th St., Denver.

National Association of Railroad and Utilities Commissioners—Dallas, Tex., Oct. 18-21. James B. Walker, 270 Madison Ave., New York.

American Engineering Council—Administrative Board, York, Pa., Oct. 20-21. I. W. Wallace, 26 Jackson Place, Washington, D. C.

Kansas Section, N.E.L.A.—Lamer Hotel, Salina, Kan., Oct. 20-21. H. L. Jones, 401 National Reserve Bldg., Topeka.

National Electrical Manufacturers' Association—Apparatus Division, Briarcliff, N. Y., Oct. 24-27; Radio Division, Edgewater Beach Hotel, Chicago, Nov. 28-Dec. 1. S. N. Clarkson, 420 Lexington Ave., New York.

Public Utilities Association of West Virginia—Parkersburg, W. Va., Oct. 26-27. A. B. McCrum, 514 Charleston National Bank Bldg., Charleston.

New England Central Station Association of Power Engineers—Chamber of Commerce, Boston, Nov. 2. T. D. Bond, C. H. Tenney & Co., Boston.

Electrical Supply Jobbers' Association—Book-Cadillac Hotel, Detroit, Nov. 14-18. F. Overbagh, 411 S. Clinton St., Chicago.

WASHINGTON STATE AGAIN TAKES EXCEPTION TO PEND OREILLE PROJECT.—Protest against the application of Colonel H. L. Cooper for a preliminary permit for the development of a power site on the Clark Fork of the Columbia River in Pend Oreille County, Wash., has been made by R. K. Tiffany, Supervisor of Hydraulics of that state. A public hearing is asked by the state official at which the relation of the power development to irrigation plans could be analyzed. Colonel Cooper's application (noted in the ELECTRICAL WORLD for Sept. 3, page 477) would involve a 400-ft. dam and the eventual development of 300,000 hp. A state permit was once before refused.

WASHINGTON-MEXICO CITY TELEPHONE LINE OPENED.—Long-distance telephonic service between the United States and Mexico was inaugurated on Thursday of last week when President Coolidge and President Calles exchanged congratulatory messages, speaking respectively at Washington and Mexico City. Ambassador Teliez of Mexico and Acting Secretary of State Carr spoke to the American Chargé d'Affaires and the Acting Minister of Foreign Affairs in the Mexican capital, and Director-General L. S. Rowe of the Pan-American Union and Walter S. Gifford, president American Telephone & Telegraph Company, explained the significance of the new international service.

BRITISH COMMISSIONERS PREPARE FIRST PART OF NEW PLAN.—The Electricity Commissioners of Great Britain have evolved the first part of the comprehensive scheme which is to be carried out under the electricity supply act and have passed it on to the Central Electricity Board. The country is to be divided into areas, and the first, it is learned, will be London and the surrounding counties and the southeast of England. Next will be the industrial Midlands. When the whole plan is in operation—although this will not be for some years—the other areas will be Yorkshire and the northeast, the west of England, Lancashire and North Wales, and South Wales and Middle Wales.

NEW HAMPSHIRE HYDRO-ELECTRIC PLANTS UNDERGOING IMPROVEMENT.—The Southern New Hampshire Hydro-Electric Corporation, serving Colebrook and immediate vicinity, has entered into a contract for the enlargement of the hydro-electric plant on the Connecticut River, between West Stewartstown, N. H., and Canaan, Vt., on the Canadian border. The work calls for an 18-in. wooden penstock to extend from the existing dam 1,400 ft. down the river and connect with a new power house. The latter is to contain an 1,100-kw.

vertical unit operating under a net head of 35 ft. The construction of 40 miles of 33,000-volt transmission line to Lancaster is included. At Lancaster connection will be made with a high-tension line operated by the Twin State Gas & Electric Company between Gorham, N. H., and St. Johnsbury, Vt. At the Gorham station of the Twin State company the dam is being strengthened at a cost of $138,000 to enlarge capacity. This development is a part of an interconnected system with three watersheds —the Androscoggin River at Gorham, the Passumpsic at St. Johnsbury and the Israel at Lancaster.

GEORGIA POWER COMPANY'S BURTON PLANT COMPLETED. — The Burton hydro-electric plant—the sixth in the Tallulah-Tugalo chain of the Georgia Power Company—went into operation on Sept. 15, completing the company's development in the northeastern section of the state. It stands at the base of the big Burton dam and will have an annual output of approximately 23,500,000 kw.-hr. and a generating capacity of 12,000 hp. Although the plant will not be considered a reserve unit, its two generators will be in operation only as the water from Lake Burton is needed in the chain further down or in case of an extraordinary demand for power from the system. Although the last to be built, the Burton plant forms the first of the chain of six, water passing first through it, then through the Nacoochee, Terrora, Tallulah Falls and Tugalo plants, and finally through the Yonah plant.

VOLTA MEMORIAL FELLOWSHIP ANNOUNCED BY ITALY-AMERICA SOCIETY. —A fund of $25,000, the income from which will be applied each year to post-graduate work in an American university by an electrical engineer from Italy, has been established by individuals, associations and corporations in this country that are interested in electrical development. This announcement, made by the Italy-America Society, was the basis last week of a cabled report printed in the ELECTRICAL WORLD's notes on the meetings of the International Electrotechnical Commission in Italy. The fund has been raised to mark the hundredth anniversary of the death of Alessandro Volta. The student who will come to the United States will be selected competitively by the Associazione Elettrotecnica Italiana, which corresponds to the American Institute of Electrical Engineers. In the United States the administration of the fellowship is in the hands of the Italy-America Society. The committee in charge of the establishment of the memorial included: Thomas A. Edison, honorary chairman; Maurice A. Oudin, International General Electric Company, chairman; J. E. Aldred, Sosthenes Behn, Paul D. Cravath, Gano Dunn, Giuseppe Faccioli, General James G. Harbord, Thomas W. Lamont, John W. Lieb, Lloyal A. Osborne, Philip Torchio and Owen D. Young.

Commission Rulings

WATER HEATING A LUXURY USE OF ELECTRICITY.—Schedules, rules and regulations have been adopted by the Idaho Power Company as prescribed by the Idaho Public Utilities Commission for electricity for water heating, auxiliary open-air heating and irrigation. The commission in fixing these rates held that equity and justice would not permit the fixing of a permanent rate which would require the users for other purposes to pay a part of the cost of electrical energy for water heating, as such a use approaches what may be termed a luxury.

WHERE CITY HAS REFRAINED FROM GRANTING FRANCHISE COMPANY WILL NOT BE COMPELLED TO EXTEND FACILITIES.—The Illinois Commerce Commission, after hearing complaints against the service rendered in Mount Sterling by the Central Illinois Public Service Company, and learning that that city had refused or neglected to grant a franchise to the company for the use of the streets, declined to order the company to expend a substantial sum in building another transmission line to improve the service. The commission found that the existing service was reasonably adequate and that the grant of a franchise should precede its improvement, since there was nothing to assure the company that the city would continue to buy service from it. Should the franchise be granted, then the company was to build the desired transmission line within one year.

OREGON COMMISSION ORDERS COMPANY TO SUPPLY DIRECT AS WELL AS ALTERNATING CURRENT.—In a recent decision of the Oregon Public Service Commission an application for a certificate of convenience and necessity was denied to the J. C. Leith Power Company of Gold Beach on the ground that it failed to include in its service both direct current and alternating current. The decision resulted from the fact that a competitor filed a protest in which the commission was asked to deny the application for the reason that direct current was already furnished the consumers. The commission also ordered the protesting company, the Gold Beach Electric Corporation, to provide both classes of service, saying that if the protestants failed to comply with the order, then the Leith company would be entitled to a certificate. The commission's stand is said to have puzzled central-station operators inasmuch as many cities in Oregon are supplied with alternating current exclusively.

OREGON COMMISSIONER GIVES VIEWS ON APPRAISAL OF LAND VALUES.—The practice of soliciting and relying upon the aid of real-estate dealers to determine the so-called "land values" of properties belonging to public utilities should not be encouraged, according to Public Service Commissioner H. H. Corey of Oregon, who, after making a careful study of appraisals found in this manner, finds that a majority are adjudged erroneous by either the regulatory department or the state and federal courts. The experience of Mr. Corey has been that while experienced real-estate agents or dealers are competent to appraise certain classes of properties directly affecting their profession, the same judgments and estimates are not applicable to the more or less technical ramifications involved in the valuation of public utility properties where the underlying reason for such an appraisal is the establishment of a base for fixing rates. The true appraisal of lands necessary in the operation of public utilities is, in his opinion, arrived at by a process of reasoning entirely different from that generally adopted when appraisements are undertaken in connection with lands used for other purposes, and largely on this account numerous appraisals in Oregon have been the source of considerable litigation. In submitting valuation or appraisal figures, Mr. Corey thinks, public utilities would do well to place greater dependence on the judgment and experience of their own engineers and other qualified employees.

Recent Court Decisions

MERCHANTABILITY OF METERS RIGHTLY SUBMITTED TO JURY IN DISPUTE OVER CONTRACT.—The Kansas City Court of Appeals held that in Bell vs. City of Fayette, an action over a contract for lease from the city of its electric light plant, the trial court was justified in submitting to the jury the question whether, the city having agreed to buy merchantable supplies on hand at the termination of the lease so far as they were of the kind then in use by electric light plants, meters on hand came in this category. (296 S.W. 1047).*

INTEREST RECOVERABLE AS PART OF DAMAGES TO REAL ESTATE FROM CONSTRUCTION OF DAM.—Affirming a judgment for the plaintiff in Knight vs. Sullivan Power Company, a suit to recover damages because of alleged injuries to real estate caused by a dam erected by the defendant 2½ miles below the plaintiff's land, the Supreme Court of South Carolina supported the right of an expert witness to express his opinion as to the effect on upper lands and streams of the pondage of water further down the channel. The court held also that the trial court did not err in instructing the jury that it could include in the damages awarded "such interest as you think should be allowed." (138 S.E. 818).

RIGHT OF CITY TO BAR WIRES FROM STREET WHERE NO FRANCHISE EXISTS.—The Supreme Court of Iowa has upheld an injunction obtained by the town of Ackley against the Central States Electric Company to prevent the latter from crossing streets with electric wires. These wires had been erected to serve an industrial establishment. The town has a municipal plant. The court found that the company had no right to enter the town without a franchise and that the use of the wires constituted a nuisance. The court also took judicial notice of the facts that charged wires stretched across a street endanger the public and that buildings could not be moved on streets across which wires were stretched at from 30 ft. to 35 ft. above the surface. It ruled that a city could obtain an injunction in the circumstances stated without showing that damage had been sustained. (214 N.W. 879).

*The left-hand numbers refer to the volume and the right-hand numbers to the page of the National Reporter System.

News About Men of the Industry

H. E. Niesz New President of National Safety Council

Homer E. Niesz, who was elected president of the National Safety Council at the recent congress held in Chicago, has been manager of industrial relations of the Commonwealth Edison Company since 1921. A native of Canton, Ohio, and a graduate of Mount Union College, Mr. Niesz is from the point of view of length of service one of the oldest Edison company men. Following graduation he engaged in electrical work as a wireman and in 1888 became connected with the Chicago Edison Company, the predecessor of the Commonwealth Edison Company. For some years he was assistant superintendent of construction, and later he

H. E. NIESZ

was advanced to be assistant to Louis A. Ferguson, then general superintendent.

In 1909 Mr. Niesz severed his connection with the company to become manager of the Cosmopolitan Electric Company of Chicago, returning to the Commonwealth Edison Company in 1913, when the Cosmopolitan company was absorbed. Mr. Niesz has participated actively in association work, including the National Electric Light Association, the American Institute of Electrical Engineers, the National Safety Council and the Western Society of Engineers, of which he is a past-president.

B. J. DENMAN, vice-president of the United Light & Railway Company and vice-president and general manager of the United Light & Power Company, which controls the United Light & Railway Company, with headquarters in Davenport, Iowa, has removed to Chicago. WILLIAM CHAMBERLAIN, vice-president and general counsel of the United Light & Power Company, has also established his headquarters in Chicago, having formerly been at Cedar Rapids. Many points, both East and West, which Mr. Denman and Mr. Chamberlain must visit frequently, are more accessible from Chicago than from Davenport or Cedar Rapids, and hence they are making their headquarters in the United Light financial and executive offices there. No changes in personnel or management are involved in this move, the engineering and operating offices remaining in Davenport as heretofore.

Hugh White President of the Alabama Commission

Hugh White, commerce counsel for the Alabama Public Service Commission, was appointed president of the commission on Sept. 15 by Gov. Bibb Graves, as reported in the ELECTRICAL WORLD for Sept. 24, page 635, this appointment filling the vacancy created by the resignation of A. G. Patterson. Mr. White has been connected with the commission since 1922, when he became its secretary. From 1923 until his appointment as president he was special counsel and commerce counsel. He was born at Spring Garden, Ala., Feb. 12, 1877. In 1898 he was graduated from the University of Georgia with the degree of A.B., and he obtained an LL.B. from the George Washington University in 1903. He practiced law at Center, Ala., from 1904 to 1911 and at Gadsden, Ala., from 1911 to 1921. He was City Attorney of Gadsden from 1916 to 1921 excepting for a period when he was in the World War. In 1921 he was made special Assistant Attorney-General of Alabama and a year later became secretary of the Alabama Public Service Commission.

FERRIS H. SMOCK, formerly general new-business manager of the Virginia Public Service Company, Charlottesville, Va., has been appointed assistant sales manager of the Associated Gas & Electric properties under the management of the J. G. White Management Corporation, with headquarters in New York. Mr. Smock's past activities in the commercial branch of the central-station field eminently qualify him for his new duties, involving the analysis of the merchandising and new-business problems of the Associated utilities. He entered the employ of the Massena (N. Y.) Electric Light & Power Company in 1915, later becoming local operating manager at Gouverneur, N. Y. Subsequent connections followed with the Vermont Hydro-Electric Corporation of Rutland and the Eastern New Jersey Power Company at Asbury Park. Before his appointment as general new-business manager of the Virginia Public Service Company Mr. Smock spent some time with the A. E. Fitkin organization as new-business supervisor of its Southern properties.

C. N. Chubb Made President of Iowa-Nebraska Utility

C. N. Chubb, a vice-president of the United Light & Railways Company and of the Iowa & Nebraska Engineering Construction Company, with headquarters at Davenport, has been made president of the Iowa-Nebraska Light & Power Company, the subsidiary of the United Light & Power Company recently formed for the purpose of unifying control of some two hundred plants in these two states and one in Missouri. He has been transferred to Lincoln and will make that city headquarters for operation of all the plants, which include electric and gas properties, street railways and ice factories. B. J. Denman, Richard Schaddelee, O. J. Shaw and

C. N. CHUBB

Frank H. Brooks are named as vice-presidents.

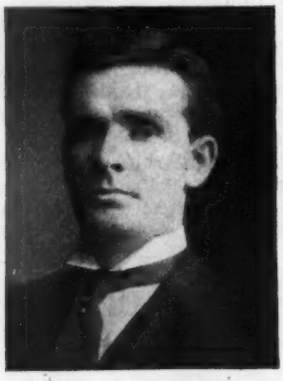
A graduate of the Massachusetts Institute of Technology, Mr. Chubb's first utility work was with the Harrisburg (Pa.) Gas Company, which was followed later by connections at Kansas City, Sioux Falls and Michigan City. Then he was promoted to the position of general manager of the Northern Indiana Gas & Electric Company at South Bend. In 1917 Mr. Chubb joined the United Light organization and was made general manager of the People's Light Company at Davenport. At the time the Lincoln (Neb.) properties were acquired by the United he was made a vice-president in charge of operations of these and Iowa plants.

Mr. Chubb has been active in association work in the Middle West for a number of years, at one time holding the office of president of the Iowa Section of the National Electric Light Association.

T. F. BARTON of the central-station engineering department of the General Electric Company at Schenectady, N. Y., has been appointed engineer of the New York district with headquarters at 120 Broadway, New York.

J. J. Cagney Heads New Corporation

Jefferson J. Cagney, formerly manager of the General Engineering & Management Corporation, New York, has been made president of the Utilities Capital Company, Inc., a new finance and management corporation with offices in New York. Mr. Cagney has had a thorough training and a wealth of experience in the public utility field, and it would appear that the directors of the Utilities Capital Company had made an



J. J. CAGNEY

excellent choice for the head of their organization.

Mr. Cagney's identification with the electrical industry dates from his association in 1898 with the Stanley Electric & Manufacturing Company of Pittsfield, Mass., through the Royal Electric Company of Montreal. He remained with the Royal Electric Company in various capacities until the sale of its manufacturing department to the Canadian General Electric Company and the consolidation of its lighting and power departments with other electric light and power companies to form the Montreal Light, Heat & Power Company. He continued with the Montreal utility until 1909, when he removed to Georgia as general manager of the Central Georgia Power Company. Later he organized and systematized the commercial departments of the Central Hudson Gas & Electric Company in Newburgh, Poughkeepsie and other towns, and in 1923 he became valuation and rate engineer of the General Engineering & Management Corporation. Three years later he was made manager of that corporation with headquarters in New York, to develop and administer its business in the field of public utility engineering, construction, operation, management and appraisal. Mr. Cagney has long been active in the affairs of the National Electric Light Association, the Illuminating Engineering Society and the American Gas Association.

R. H. GOODWILLIE, manager of the Otis Elevator Company, Yonkers, N. Y., was elected treasurer of the National Electrical Manufacturers' Association by the executive committee at its meeting Sept. 16, according to an announcement by Gerard Swope, president. Mr. Goodwillie is succeeding J. W. Perry, formerly associated with the Johns-Manville Corporation, who has resigned from active business connections. I. A. BENNETT of the National Molding Company, Pittsburgh, Pa., will succeed Mr. Perry as a member of the board of governors.

ARRIGHI DE CASANOVA, chief engineer, and R. BOUVATTIER, assistant chief engineer of the Union d'Electricité of Paris, are at present touring the United States with the purpose of making a study of steam-plant practice in this country.

ROBERT F. PACK, vice-president and general manager of the Northern States Power Company and a past-president of the National Electric Light Association, has returned to Minneapolis after a two months' trip to Europe. Mr. Pack spent most of his time in England and France with a short sojourn in Spain.

J. B. Hill Joins A. G. & E. Company

J. B. Hill, for the past year and a half manager of the Ohio properties of the United Light & Power Company, has affiliated himself with the American Gas & Electric Company as assistant to Frank Espy, first vice-president. In his new connection Mr. Hill will be concerned with the operation of all of the company's properties north of the Ohio River from the Atlantic Coast to as far west as Rockford, Ill. Prior to his connection in Ohio Mr. Hill was connected with the Lincoln Gas & Electric Light Company of Lincoln, Neb., which with some of the properties formerly owned by the Lincoln Traction Company is now the Lincoln Public Service Company.

Previously Mr. Hill had spent fourteen years in academic work on the electrical engineering faculty of the University of Iowa, during which time he built up an extensive consulting practice among utilities of the Middle West. Earlier in his career he was identified with the Union Electric Light

J. B. HILL

& Power Company of St. Louis, the United States Steel Corporation at Eveleth, Minn., and the Westinghouse Electric & Manufacturing Company at East Pittsburgh, Pa., and Memphis, Tenn. For the present his headquarters will be at the American Gas & Electric Company offices in New York.

Obituary

THOMAS B. DAVIS, pioneer in the development of hydro-electric power in the Moline-Rock Island (Ill.) district, died Sept. 20 at his home in Rock Island after a ten days' illness. He and his brother organized the Moline Water Power Company and later the Merchants' Electric Light Company, furnishing electric power for that city, and subsequently they established similar service in Rock Island and in Davenport, Iowa. The Davis utility properties later were sold and their interests were transferred to the lumber industry. Mr. Davis was 71 years of age.

HENRY LE FANU, chief engineer of the Société des Ateliers de Constructions Electriques de Charleroi, died recently in that city in his fifty-sixth year. Mr. Le Fanu was born in Dublin, Ireland, and was educated at Cassel and Munich, Germany. He was for six years with the Brown, Boveri Company in Switzerland, joining the Belgian Société Electrique et Hydraulique in 1899 and, on its formation, the Charleroi company, in whose service he subsequently remained, rising to the position of chief engineer.

PROF. SVANTE ARRHENIUS, famous chemist and astronomer, died Oct. 2 at Stockholm, Sweden, in his sixty-eighth year. Professor Arrhenius, who had been the director of the physico-chemical department of the Nobel Institute at Stockholm since 1905, was well known in scientific circles in the United States, having made a lecture tour in this country under the auspices of the Lowell Institution of Boston in 1911. His scientific achievements won frequent recognition. He won the Davy medal in 1902, the Nobel prize in 1903 and the Faraday medal in 1914. Heidelberg and Groningen made him a doctor of medicine, *honoris causa;* Oxford and Cambridge bestowed the honorary degree of doctor of science. He was also an honorary doctor of philosophy at Leipzig and a doctor of law at Birmingham. Dr. Arrhenius was the originator of the theory of electrolytic dissociation, first announced in 1884 and amplified in 1887. Professor Arrhenius' books, which were originally written in Swedish and translated into several other languages, include "Electrochemistry," "Chemistry and Modern Life" and other similar works.

Financial and Statistical News

Common Stocks Recede Little Withstand Selling Movement Bond Trading Heavy

AFTER steadily gaining ground during the early part of the month, many of the utility issues sold off during the heavy selling movement early this week. It is noticeable, however, that losses were much smaller and more limited in number than in the other parts of the market. A few issues like American Water Works & Electric, Commonwealth Edison, Central States Electric and Philadelphia Electric showed gains in common-stock quotations even during the period of heavy selling. Many others remained unchanged, so that the net loss in power and light stocks was quite small.

The volume of trading in preferred stocks has been reasonably heavy, but few price changes of importance are recorded. Gains were made by such stocks as American Light & Traction, Commonwealth Power, Mississippi River Power 6's and Middle West Utilities 6 per cent preferred.

Activity in the bond market continues on a high level despite advanced prices, and a few marginal price gains are recorded in the week's trading.

Utilities Capital Company Organized

A new finance and management corporation has just entered the public utility field, incorporated as the Utilities Capital Company, Inc., with headquarters at 80 Wall Street, New York. In addition to its financing activities the corporation will operate and manage public utility properties—electric, gas, water, etc.—both domestic and foreign. It will also be prepared to handle consolidations and reorganizations, to make surveys, investigations, examinations, valuations, to make analyses and offer suggestions for improving operating methods and ratios, and to advise on interconnections, rate situations, budgeting, new-business opportunities, etc. In short, the corporation will be equipped to suggest solutions for the various problems of the utility field.

Power Study Shows Importance of Coal in Generation

The total amount of electricity produced at public utility power plants in 1926 was 73,791,000,000 kw.-hr., according to an investigation made by the Geological Survey, Department of the Interior. Of this total power generated, 57.7 per cent was produced from coal, 35.5 per cent from water, 3.1 per cent from oil, 3.3 per cent from gas and 0.4 per cent from wood. The use of fuel oil in generating electricity has declined since 1924, when it reached its maximum. The amount used in 1926 was the least since 1918 and only 57 per cent of that consumed in 1924.

The best fuel rates for these fuels were about as follows: Coal, 0.9 lb. per kilowatt-hour; oil, 450 kw.-hr. per barrel; gas, 13 cu.ft. per kilowatt-hour. As these are, roughly, one-half the average actual rates, the consumption of fuel by electric public utility power plants would be reduced one-half if all of them produced electricity at the best fuel rates. The attainment of this degree of efficiency would have conserved 20,000,000 tons of coal in 1926, representing about $75,000,000.

United States Capital Bids for Canadian Properties

In competition with Canadian capital, the Northwest Light & Power Company has made a bid for purchase of the power system of Yorkton, Saskatchewan. Other bidders are the Midwest Utilities and the Montreal Engineering Company. The Northwest Light & Power Company offers $190,000 cash with reductions in street lighting and pumping charges. It is intimated that the American company proposes to use Yorkton as the terminus of a large distribution system throughout the area to the north.

Big Utility Expands in Foreign Field

American & Foreign Power Company Plans to Acquire Properties Which Will Make It the Largest American Unit Operating in Countries Beyond the National Boundaries

AMERICA'S capital surplus is finding an attractive market in the development of public utilities abroad. By the proposed acquisition of a group of utilities in South America, France and Japan, the American & Foreign Power Company moves forward to first place in the control of public utility companies in the foreign field. The properties referred to have already been acquired by Electric Bond & Share Company under a specially established subsidiary, the South American Power Company. It is proposed that the entire stock of this last-named company be transferred to the American & Foreign Power Company in exchange for 364,175 shares of the latter's second preferred stock, series A, to be issued.

The properties involved in the transaction are situated in Brazil, Colombia, France and Japan. The announced total cost is $36,417,597. The properties include electric power and light, railway and telephone companies in the various countries named. It is stated that South American Power, a Florida company, has acquired the properties and securities accumulated by the Electric Bond & Share Company amounting to $26,000,000 in 6 per cent debentures, 70,000 shares of seven-dollar preferred stock, 50,000 shares of seven-dollar second preferred stock and 1,000,000 shares of common stock, all without par value, full-paid and non-assessable.

The American & Foreign Power Company, Inc., now has outstanding only 114,019 shares of second preferred stock, series A, which were issued upon the incorporation of the company and which are entitled to 7 per cent dividends cumulative from Jan. 1, 1924. No dividends have been paid upon these shares. If the plan now proposed is accepted, the shares of second preferred stock, series A, to be issued will bear dividends only from Oct. 1, 1927, and each certificate therefor will be stamped to that effect, so that there will be no confusion as between the shares of second preferred stock originally issued and those to be issued under this plan.

Included in the properties that will become a part of the American & Foreign Power Company group if the plan is consummated are electric power and light and railway properties in Petropolis and electric power and light properties in Nictheroy, Brazil; electric power and light and railway properties in Bahia, Brazil, and adjacent communities; electric power and light properties in Victoria and Itapemirim, Brazil, and adjacent communities; railway properties in Victoria, Brazil; electric power and light properties in a number of communities in the State of São Paulo, telephone properties in Victoria and Bahia, Brazil, and electric power and light properties in Barranquilla, Colombia, and vicinity.

Earnings of Present Subsidiaries

The stockholders of the American & Foreign Power Company, Inc., will hold their annual meeting in Augusta, Me., on Oct. 18, and this plan for acquiring the securities of the South American Power Company will be discussed.

The present properties controlled by the American & Foreign Power Company, Inc., operate in Cuba, Panama, Guatemala and Ecuador. Gross earnings of present subsidiaries during the period of ownership only for twelve months ended June 30, 1927, aggregated $15,313,100 and net earnings $7,841,510. Gross earnings of the properties irrespective of dates of acquisition for the twelve months were $18,788,930 and net earnings $9,835,074.

Utilities Market New Securities Totaling $62,000,000

During the first week of October electric light and power companies floated new offerings to the amount of $61,450,000. A Canadian company, the Shawinigan Water & Power Company, contributed $35,000,000 to this total in the form of first mortgage and collateral trust sinking-fund gold bonds priced at 95½ and accrued interest, yielding over 4.75 per cent. Proceeds of these bonds, together with proceeds of 100,000 shares of capital stock, will be used to retire, through call, all present funded debt of the company, aggregating $26,392,500, and to supply more than $9,000,000 to defray cost of additions, improvements and acquisitions.

Another substantial issue was that of the Duquesne Light Company amounting to $10,000,000. The offering comprised first mortgage 4½ per cent gold bonds, the price being 99 and accrued interest, to yield 4.55 per cent. Proceeds of these bonds, dated April 1, 1927, and maturing April 1, 1967, will be used to reimburse the company for expenditures for additions and extensions heretofore and now being made to its properties and for other corporate purposes.

Six per cent convertible gold debentures, series A, were issued by the American Electric Power Corporation to the amount of $6,500,000, the offering price being 99 and accrued interest, to yield about 6.05 per cent. Proceeds from the sale of these debentures will reimburse the corporation in part for the purchase of certain of the properties which comprise this system.

The Central Power & Light Company issued first mortgage 5 per cent gold bonds to the amount of $4,000,000 at 97 and accrued interest, to yield 5.20 per cent.

The Eastern Shore Public Service Company made an offering of first mortgage and first lien 5½ per cent gold bonds, series A, to the amount of $3,300,000, the price being 100 and accrued interest, to yield 5.50 per cent. The proceeds from the sale of these bonds and shares of preferred and common stocks will be used for the retirement of the present outstanding funded debt of the company, to reimburse the treasury of the company and its subsidiaries for recent additions and betterments and for other purposes.

An additional issue of 6 per cent cumulative preferred stock of the Potomac Edison Company was offered during the week under review at $100 per share and accrued dividend, a piece of financing involving a total of $2,650,000. Proceeds will be used to partly reimburse the company for additions, extensions and improvements, including a new 30,000-kw. unit in the Williamsport station.

Public Service Raises $6,000,000 in Campaign

The Public Service Corporation of New Jersey announces that a total of $6,103,300 of its 6 per cent cumulative preferred stock was sold on the first day of the stock-ownership campaign now in progress. The sale consisted of 61,033 shares at $100 par value each, the stock being sold to 7,981 individual subscribers, as indicated by incomplete returns. This showing establishes a new high record passing any showing made during previous campaigns and is equal to almost double the amount unofficially offered in the current campaign, which was 35,000 shares.

During the stock-ownership campaign

Stock Quotations of Electric Light and Power and Manufacturing Companies

(Prices on New York stock market unless otherwise noted. Unless otherwise noted the par, stated, or preference value of stock is $100.)

Companies	Bid Price Tuesday Oct. 4	Low 1927	High 1927
ABITIBI PWR. & PAPER, 4% com.—no par	125½	83	127
Adirondack Pwr. & Lt.—7% pf.	110½	107	113½
Adirondack Pwr. & Lt.—8% pf.	115	112	116
Ala. Pwr., $7 cum. pf.—no par	111½	107	112½
Allis-Chalmers Mfg., 7% pf.	m111½	109	112½
Allis-Chalmers Mfg., 6% com.	117½	88	118½
Aluminum Co. of Amer., com.	98	67½	105½
Aluminum Co. of Amer., 6% of	103½	101½	104½
Amer. & Foreign Pwr., pf. 25% pd.	m110	....	....
Amer. & Foreign Pwr., 7% pf.—no par	107	86½	108
Amer. & Foreign Pwr., com.—no par.	29½	18½	30½
Amer. Bosch Magneto, com.—no par	26½	13	26½
Amer. Brown Boveri Elec†	9½	5½	39½
Amer. Brown Boveri Elec., pf. $7	47½	40	98
Amer. Gas & Elec., 6% pf.—no par	104	95½	105½
Amer. Gas & Elec., com.†—no par.	115	68½	117½
Amer. Lt. & Trac., 6% pf.	113	112	120
Amer. Lt. & Trac., new com.	184½	164½	186
Amer. Pwr. & Lt., 6% pf.	106½	97½	106½
Amer. Pwr. & Lt., com.†—no par.	70½	54	70½
Amer. Pub. Serv., 7% pf.	a 98½	94	104
Amer. Pub. Serv., com.†	70	....	....
Amer. Pub. Utilities, 7% pfd. pf.	a 87½	73	88½
Amer. Pub. Utilities, 7% pr. pf.	a 95	92	96
Amer. Pub. Utilities, com.	k 53	65	70
Amer. States Sec., A.	4½	2½	4½
Amer. States Sec., B.	4½	2½	4½
Amer. Superpwr., 6% pfd. pf.—25	k 29	26½	29½
Amer. Superpwr., 6% 1st pf.	j 98½	....	....
Amer. Superpwr., Class A†—no par.	41½	27½	41½
Amer. Superpwr., Class B†—no par.	42½	28½	43
Amer. Wtr. Wks. & Elec., 7% pf.	m111½	104½	111
Amer. W. W. & E., com. new—no par	70	46	72½
Anaconda Copper cap. $3.	48½	41½	72½
Appalachian Electric Pwr., 7% pf.	106	100	107
Appalachian Elec. Pwr., com.	m 78	77	83
Arizona Pwr., 7% pf.	k 74	77	84½
Arizona Pwr., com.	m 20	....	....
Arkansas Pwr., & Lt. 7% pf.	105	....	....
Assoc. Gas & Elec., $3.50—50	51	....	....
Assoc. Gas & Elec., pf.—$6—no par.	93	85	93
Assoc. G. & E., Class A, 10—no par.	42½	35	43½
BABCOCK & WILCOX, 7% com.	117	113	124
Binghamton L., H. & P., $6 pf.	98	93	100
Birmingham Elec., pf.—$7—no par.	107	105	109
Blackstone Valley G. & E., 6% pf.	k106	103	105
Blackstone Valley Gas & Elec., 10% com.—50	137½	98	154½
Blaw-Knox, com.†	f 95	70	95
Brazilian Trac., Lt. & pwr., com.†	f210	....	....
Broad River Pwr., 7% pf.	104	97	103
Brooklyn Edison, 8% com.	180	148½	184½
Buffalo, Niagara & East. Pwr., $1.60 pf.—25	f 25½	....	....
Buffalo, Niagara & East. Pwr. com. $1—no par.	f 36½	....	....
CALIFORNIA ELEC. GENERATING, 6% pf.	98	96	99½
California Ry. & Pwr., 7% pf.	135	125	150
Carolina Pwr. & Lt., pf.—$7—no par	h109	107	109½
Central & S.W. Util., $7 pf.—no par	a 96½	92½	97½
Central & S.W. Util., pr.ln.$7 pf.—no par	a101½	98½	104⅛
Central Ariz. Lt. & Pwr., 8% pf.	k 97	95	98
Central Ark. Ry. & Lt., 7% pf.	106	100	104
Central Ill. Pub. Serv., $6 pf.	a 92½	88½	95½
Central Ind. Pwr., 7% pf.	a 92½	85½	95
Central Pwr. & Lt., 7% pf.	101	100½	103
Central States Elec., 7% pf.	97	93	97
Central States Elec., com.†	f 28½	17½	28½
Century Elec., 6% com.	b131	114	131
Chicago Fuse Mfg., com.—$2.50 no par.	a 35	30	35½
Cincinnati Gas & Elec., 5% com.	g 99½	96½	100½
Cities Service, $6 pf—no par.	j 91½	87	92½
Cities Service, pf. B—no par.	j 8	8	8½
Cities Service, pf. BB—no par.	j 82½	80½	85
Cities Service, com.—20.	j 49½	40½	58½
Cities Service, Bks. Shrs.—10.	j 24½	22½	27
Clarion River Pwr., 8% pf.	95	....	....
Cleveland Elec. Illg., 6% pf.	110½	108	112
Cleveland Elec. Illg., 10% com.	322	285	330
Columbia Gas & Elec., 6% pf.	106½	99½	107½
Columbia G. & E. com. $5—no par.	93½	82½	100½
Columbia Ry., Gas & Elec., 6% pf.	m 98	97	100
Columbus Elec. & Pwr., $2 com.—no par	68	....	....
Columbus Ry., Pwr. & Lt., 6% 1st pf.	104	98½	104
Columbus Ry., Pwr. & Lt., 6½% pf. B	103	96	103½
Columbus Ry., P. & L., com.—no par	102	75	105
Commonwealth Edison, 8% com.	g159	138	159
Commonwealth Pwr., 6% pf.	102	91½	102
Commonw'th Pwr., $2, com.—no par	76½	48½	76½
Conn. Lt. & Pwr., 8% pf.	121	119	123
Conn. Lt. & Pwr., 7% pf.	117	112	118
Cons. Gas of N. Y., pf.	99½	93	100½
Cons. Gas of N. Y., com $5—no par.	119½	94	121½
Cons. Gas, Elec. Lt. & Pwr. of Balti., 6% pf.	k105	105	107
Cons. Gas, Elec. Lt. & Pwr. of Balti., 6½% pf.	e113	110½	114½
Cons. Gas, Elec. Lt. & Pwr. of Balti., 7% pf.	e116½	112½	117
Cons. Gas, Elec. Lt. & Pwr. of Balti., 8% pf.	e127½	127	130½
Cons. Gas, Elec. Lt. & Pwr. of Balti., com. $2.50—no par.	e 71	51	71
Consolidated Pwr. & Lt., 7% pf.	105	100	106
Consumers Pwr., 6% pf.	103½	100	102
Consumers Pwr., 6.6% pf.	105½	103	105½
Continental Gas & Elec., 8% pfd. pf.	107½	103	106½
Continental Gas & Elec., 7% pr. pf.	104	100	103
Conti. G. & E. com. $4.40—no par.	k250	210	225
Crocker Wheeler, com.†	25	30	38
Crocker Wheeler, 7% pf.	51	78	88
DALLAS PWR. & LT., 7% pf.	109	107	110½
Dayton Pwr. & Lt., 6% pf.	107	101	107
Detroit Edison, 8% com.	157	133½	160½
Dubilier Condenser, com.—no par.	4½	2½	5½
Duquesne Lt., 7% pf.	k 116	114½	116½
EASTERN NEW YORK UTIL., $7 pf.	107	102	104½
Eastern New York Util. com.	65	70	75
Eastern States Pwr., $7, com.	9	9	13
Eastern States Pwr., pf.	95	90	95
East. Tex. Elec., 7% pf.	106	106	108
Edison Elec. of Boston, $12 com.	d263½	217	267
El Paso Elec., 7% pf.	109	105	107½
Elec. Bond & Share, 6% pf.	h110	105½	110
Elec. Bd. & Sh. Sec., com. $1—no par	i 78½	67½	80½
Electric Household Util.†	a 13½	11	15½
Elec. Investors, 6% pf.—no par.	96	92	97
Elec. Investors, com.†—no par.	42½	32½	42½
Elec. Investors, 10% pd. receipts	m 15	....	....
Elec. Pwr. & Lt., ctfs. pf.	106½	96	106½
Elec. Pwr. & Lt., ctfs., 40% pd.	k119	103½	119
Elec. Pwr. & Lt., ctfs., full pd.	m114	108½	111½
Elec. Pwr. & Lt., ctfs., com.—no par.	29½	16½	29½
Elec. Refrig. cap.†	10½	9½	37½
Elec. Ry. Securities, com.—no par.	6	....	....
Elec. St. Battery com. $5.25—no par	73	63½	79½
Elmira Wtr., Lt. & R.R., 7% pf.	103	99	101
Emerson Elec., pf.	m109	107½	111
Empire Pwr., pfc.†	34	26	39
Engr. Pub. Serv., $7 pf.—no par.	106	93½	106½
Engr. Pub. Serv., com.—no par.	37½	21½	37½
Eureka Vacuum Cleaner, com. $4—no par.	73½	50	77
FAIRBANKS MORSE, 7% pf.	k109	107½	112
F.-M., com.—$3—no par.	36	32	43½
Federal Lt. & Trac., com. $1.40.	42½	37½	47
Federal Lt. & Trac., $6 pf.—no par.	k 99	91½	100
Ft. Worth Pwr. & Lt., 7% pf.	h111½	108	112
GALVESTON-HOUSTON ELEC. 6% pf.	78½	68	72
Galveston-Houston Elec., com.	35½	22	37½
Gen. Elec., $3 com.—no par.	140½	81	146½
Gen. Elec., special—6%.	11½	11	11½
Gen. Gas & Elec. (Del.) com. A. $1.50—no par	39½	34	47½
Gen. G. & E. (Del.) com. B—no par.	m 45	35½	44½
Gen. G. & E. (Del.) pf. A. $8—no par.	k117	113½	120
Gen. G. & E. (Del.) pf. A $7—no par.	k109	100	110
Gen G. & E. (Del.) pf. B $7.	k102	96	105
Gen. Pub. Serv., $7 cum. pf., no par.	k109	102	106
Gen. Pub. Serv., com., no par.	15½	11½	15½
Ga. Lt., Pwr. & Rys., 6% pf.	94	87	96
Ga. Lt., Pwr., & Rys., com.	m 50	50	80
Ga. Ry. & Pwr., 8% pf.	k125	119	125
Ga. Ry. & Pwr., 7% pf.	h113½	106	110
Gt. Western Pwr., 7% pf.	h102	....	....
IDAHO PWR., 7% pf.	106	103	109
Ill. No. Utilities, 6% pf.	a 96½	92	97
Ill. Pwr. & Lt., 7% pf.	k101	99	101½
Ingersoll Rand com. $8.	91	88	96½
Int. Combus. Engr., com. $2—no par	49½	43½	64
Int. Util., Class A—$3.50—no par.	40½	28	45½
Int. Utilities, Class B—no par.	6½	3	7½
Interstate Pwr., pf.—$7—no par.	k 95	93	98
Interstate Pub. Serv., 7% pf.	100	98	99½
Iowa Ry. & Lt., 7% pf.	97	97	99
JERSEY CENTRAL PWR. & LT. CO., 7% pf.	104½	97½	105
Johns-Manville, com.†—no par.	122½	55½	122½

Stock Exchange: *a*Chicago; *b*St. Louis; *c*Philadelphia; *d*Boston; *e*Baltimore; *f*Montreal; *g*Cincinnati; *h*San Francisco; *i*Pittsburgh; *j*Washington. *k*Bid price Saturday, Oct. 1. *l*Bid price Wednesday, Oct. 5. *m*Latest quotations available. †Dividend rate variable.

last April a total of $1,982,900, or 19,829 shares, was sold on the first day of the campaign and a total of $6,150,600, or 61,506 shares, was sold in the seven days of the spring campaign when the offering was twice oversubscribed.

Electric Service on the Farm

The report of the rural electric service committee of the National Electric Light Association says that on Jan. 1, 1927, in 27 states there were 227,442 farms having electric service from central stations. On this basis the farms in the United States receiving such service probably number about 350,000.

At the same time it has been estimated that 300,000 farms in the United States have individual lighting plants, which makes the total number of farms having electric service of one kind or another about 650,000.

Private and City Distributors in Keen Competition

The rather intense competition now being waged in the Montreal area between the Montreal Light, Heat & Power Consolidated and Westmount's municipal distribution system is of interest in those sections of this country where similar competition exists. As the municipal system sends out circular letters in large volume, the private system continues to publish large-sized advertisements in the daily press urging Westmount citizens to place their faith in the private system.

The trouble between the two power distributors arose when Montreal Power circularized some of its customers in the city of Westmount offering them customer-ownership stock in the company, provided that they changed the source of their power supply from the municipal to the private system. Westmount's system countered this move by reducing the light rate below that prevailing in Montreal. Montreal Power immediately reduced its rate, but made the reduced rate applicable only to customers of the Westmount service.

"The private corporation offers an immediate gain to the citizens of Westmount by its offer of selling customer ownership stock at $50 per share. While the customers of the Westmount service could undoubtedly make an immediate profit by accepting the Montreal Light, Heat & Power Consolidated's offer, yet there exists a strong community spirit within the municipality. Thus, while undoubtedly the private corporation will increase its customers in Westmount, it is thought that very many of the Westmount users of power will refuse to accept the offer made by the power company," says the *Financial Post.*

Stock Quotations of Electric Light and Power and Manufacturing Companies (Continued)

(Prices on New York stock market unless otherwise noted. Unless otherwise noted the par, stated, or preference value of stock is $100.)

Companies	Bid Price Tuesday Oct. 4	Low 1927	High 1927
KANSAS CITY PWR. & LT. pf.$7	k115	112	115½
Kansas Gas & Elec., 7% pf.	i106½	103	107
Kentucky Hydro-Elec., 7% pf.	m 98	94½	100
Kentucky Sec.,6% pf.	86	83	87
Kentucky Sec., 5% com.	109	110	115
Kentucky Utilities, 6% pf.	100	95	101
Keystone Pwr. & Lt., pf.	m 98	95	100
LACLEDE GAS LT., 12% com.	218	173½	267½
Lehigh Pwr. Sec., com.—no par.	21½	15	21½
Long Island Ltg., 7% pf.	111½	107½	114
Long Island Ltg., com.†—no par.	158½	140	158½
Los Angeles Gas & Elec., 6% pf.	102	98	104½
Louisville Gas & Elec., cl. A. $1.75	27	23½	27½
MAN. ELEC. SUPPLY, cap. $5 —no par	50½	49	132
Manila Elec., com.†—no par.	k 54½	40	50
Maytag Mfg., com. .50—no par.	33½	23½	34½
Memphis P. & L., pf.—$7—no par	108½	107	109
Metropolitan Ed., pf.—$6—no par.	101½	93	100
Metropolitan Ed., pf.—$7—no par.	108	104	108
Metropolitan Ed., com. $5—no par.	75	60	72
Middle West Utilities, 7% pf.	a112½	110½	113½
Middle West Util., 8% pr. lien	a120½	117½	122½
Middle West Util., com. $6—no par	a113	108	117½
Midland Utilities, pr. ln. 6% pf.	a 95	92½	96
Midland Utilities, 7% pf. A.	a106	97½	107½
Milwaukee Elec. Ry. & Lt., 7% pf.	k102	100	103
Milwaukee Elec. Ry. & Lt., 6% pf.	k 98½	98	101½
Minn. Pwr. & Lt., 7% pf.	i107	104	107
Miss. Pwr. & Lt., $8 pf.	m101	106	103
Miss. River Pwr., 6% pf.	102½	101	102½
Miss. River Pwr. 3% com.	62	....	....
Mohawk Hudson Pwr., 1st pf.—$7 —no par	106	100	109
Mohawk Hudson Pwr., 2d pf.—$7 —no par	110	98	112
Mohawk Hudson Pwr., com.—no par	31	20½	32½
Montana Pwr., 7% pf.	m106½	118½	106½
Montana Pwr., 5% com.	104½	81½	106½
Montreal Pwr., 7½% com.	f 91½	....	....
Mountain States Pwr., 7% pf.	99½	97	101
Mountain States pwr., com.†	18	....	....
NASSAU & SUFFOLK LTG., 7% pf.	107	98	105
National Carbon, 8% pf.	a137½	130½	139½
National Elec. Pwr., A†	a 25½	22	25½
National Lt., Ht. & Pwr., com.	24	....	....
National, Light, Ht. & Pwr., 6% pf.	70	....	....
National Pwr. & Lt., pf.—$7—no par	107	101	108½
National Pwr. & Lt., com.†—no par.	26½	19½	26½
National Pub. Serv., 7% pf.	100	93	100
National Pub. Serv., 7% ptc., pf.	113	108	115
National Pub. Serv., A com. $1.60— no par	23½	18½	24
National Pub. Serv., B com.—no par	19	14	20½
Nebraska Pwr., 7% pf.	i110	106	110
Nevada-Calif. Elec., com.	32	25	32
New Brunswick Pwr., 4% pf.	60	....	....
New Eng. Pub. Serv., pr. ln. pf. $7..	101	98½	102
New Eng. Pub. Serv., pf. $7.	98	95	99
New Orleans Pub. Serv.—7% pf.	103	103	105½
N. Y. & Queens Elec. Lt. & Pwr., 5% pf.	90	91	97
N. Y. Central Elec., 7% pf.	102	101	104
Newport News & Hampton Ry., Gas & Elec., 5% com.	109	....	....
Newport News & Hampton Ry., Gas & Elec., 7% pf.	109	....	....
Niagara Falls Pwr., 7% pf.—25.	k 28½	27½	29½
Niagara, Lock. & Ont. Pwr., 7% pf.	111	110½	113
No. Amer., 6% pf.—50.	53½	50	55
No. Amer., com.—10	64½	45½	64½
No. Caro. Pub. Serv., pf.—$7—no par	101	93	102½
Northeastern Pwr., com.	20½	14½	20½
No. N. Y. Utilities, 7% pf.	106	103	109
No. Ohio Pwr., com.—no par.	18½	9½	18½
No. Ohio Trac. & Lt., 6% pf.	83	78	81
No. Ont. Lt. & Pwr., 6% pf.	k 91	84	95
No. Ont. Lt. & Pwr., 4% com.	72	73	78
No. States Pwr., (Del.) 7% pf.	106½	101	107½
No. States Pwr., (Del.) 8% com.	133	109½	133
No. Texas Elec., 6% pf.	65	65	70
No. Texas Elec., com.	26½	27	36
OHIO BRASS, com. B $4—no par.	84	74	85½
Ohio Brass, 6% pf.	105	100	105
Ohio Pwr., 6% pf.	100½	96	103
Ohio Pub. Serv., $6 pf.	98½	95	96½
Ohio Pub. Serv., 7% pf.	107	103	109
Ohio River Edison, 7% pf.	108	103	109½
Oklahoma Gas & Elec., 7% pf.	102½	...	....
PACIFIC GAS & ELEC., 6% pf.	26½	24½	26½
Pacific Gas & Elec., 8% new com.	45	31	45½
Pacific Pwr. & Lt., 7% pf.	i104½	102	104½
Penn Cent. Lt. & Pwr., $5 pf.—no par	c 77½	75½	77½
Penn-Ohio Edison, 7% pf.	m103½	97½	104½
Penn-Ohio Elec., 7% pf.	m102	99	103
Penn-Ohio Pwr. & Lt., 7% pf.	102	99	103
Penn Pwr. & Lt.—$7—no par.	i109½	107	109
Penn Wtr. & Pwr., 8% com., new.	c 73½	47½	73½
Phila. Co., 6% pf.—50.	c 52½	49½	54
Phila. Co., com.—50.	106	85½	110
Phila. Elec., 8% com.—25.	c 56½	46½	58½
Portland Elec. Pwr., 7% pf.	100	97½	101
Portland Elec. Pwr., 6% pf.	80	78	83
Portland Elec. Pwr., 6% 2d pf.	65	55	70
Portland Elec. Pwr., com.	27	22	30
Potomac Elec. Pwr., 6% pf.	i110½	....	....
Pwr. Corp. of N. Y., com. $1—no par	m 79	....	....
Pwr. Sec., pf.—no par.	k 38	28	43
Pwr. Sec., com.—no par.	k 11	5	8
Public Serv. of Colorado, 7% pf.	i102	....	....
Pub. Serv. of N. J., 6% pf.	101	98½	101½
Pub. Serv. of N. J., 8% pf.	k130	125	132
P. S. of N. J., $2 com.—no par.	45½	32	46½
Pub. Serv. of No. Ill., 6% pf.	a106½	101½	106½
Pub. Serv. of No. Ill., 7% pf.	a117½	112½	117½
P. S. of No. Ill., com. $8—no par.	a145	140½	143
Pub. Serv. of No. Ill., $8 com.	a145	132	142
Pub. Serv. of Okla., 7% pr. ln.	k117	112½	117½
Pub. Serv. Elec. & Gas, 6% pf.	107½	102	108½
Puget Sound Pwr. & Lt., 7% pr. pf.	106½	105	107
Puget Sound Pwr. & Lt., $6 pf.—no par	88	....	....
Puget Sound Pwr. & Lt., com.	38	28	38½
RADIO CORP. OF AMER., $3.50 pf.—50	54	49	54½
Radio Corp. of Amer., com.—no par.	68½	41½	68½
Republic Ry. & Lt., pf.	m120	....	....
Republic Ry. & Lt., com.	m135	112	135
Rochester Gas & Elec. 6% pf. D.	k104½	101	103½
Rochester Gas & Elec., 7% pf. B.	104	105	107
Rochester Gas & Elec., 6% pf. C.	k104½	101½	103½
SAFETY CABLE, com. $4.	68½	52½	74½
San Joaquin Lt. & Pwr., 7% pr. pf.	106	105	108
St. Joseph Ry., L., H. & P., 6% pf.	72	70	73
Servel Corp.	79cts	52cts	10½
Sierra Pacific Elec., 2% com.	31½	24½	31½
Sioux City Gas & Elec., 7% pf.	104	99	104
Southeastern Pwr. & Lt., pf.—$7 no par	i110½	....	....
Southeastern Pwr. & Lt. ptc. pf.	i 83½	....	....
Southeastern Pwr. & Lt., com.—no par	40	29½	40
So. Calif. Edison, 8% pf.	39	36½	40
So. Calif. Edison, 7% pf.	k 28	27½	28½
So. Calif. Edison, 6% pf.	25	24½	26
So. Calif. Edison, 8% com.	41	31½	41
Southern Cities Utilities, 7% pf.	k 72	67	90½
Southern Cities Utilities, com. $4.	m 32½	23½	42½
Southwestern Lt. & Pwr., A $3.	63	60	65
Southwestern Lt. & Pwr., B.	63	60	65
Southwestern Lt. & Pwr., $6 pf.	86	83	91½
Southwestern Pwr. & Lt., 7% pf.	k109	103	110½
Springfield (Mo.) Ry. & Lt., 7% pf.	102	95	102
Standard Gas & Elec., 8% pf.	64½	57½	64½
Standard Gas & Elec., 7% pr. pf.	109½	103	110
Standard G. & E., com. $3.50—no par	65½	54	65½
Standard Pwr. & Lt., 7% pf.	101½	98	102½
Staten Island Edison, pf.—$6—no par	100	99	101
Superheater, $6 com.—no par.	177	170	185
Syracuse Lighting, 7% pf.	110	103	107
Syracuse Lighting, 8% pf.	117½	....	
Syracuse Lighting, 8% com.—no par	m300	....	....
TAMPA ELEC., com. $2.	63½	49	64½
Tenn. Elec. Pwr., 6% pf.	98½	92	99
Tenn. Elec. Pwr., 7% pf.	107½	103	109
Terre Haute, Ind. & East. Trac., 5% pf.	26	20	30
Terre Haute, Ind. & East. Trac., com	1	1	3
Tex. Pwr. & Lt., 7% pf.	i112	106	111½
Tide Water Pwr., 8% pf.	107	105	110
Timken Roller Bear., com.—$4 no par.	122½	78	142½
Toledo Edison, 8% pf.	114	115	118
Toledo Edison, 7% pf.	i107	....	....
Toledo Edison, 6% pf.	k 98½	95	97
Toledo Edison, 6% com.	98	....	....
Tri-City Ry. & Lt., 6% pf.	96½	96	99
UNITED GAS & ELEC., 6% pf.	101	98	102
United Gas & Elec., com.—no par.	m 57	....	....
United Gas & Elec. (N. J.) 5% pf.	72	70	73
United Gas Impr., 8% com.—50.	c 115½	89½	118½
United Lt. & Pwr., pf.—$4—no par.	a 57	50	57
United Lt. & Pwr., pf.—$6.50—no par.	a 95	87	97½
United L. & P., com. A .48—no par.	15	12½	15½
United L. & P., com. B .48—no par.	a 19	15	24
Utah Pwr. & Lt., 7% pf.	i107	104	108½
Utica Gas & Elec., 7% pf.	105	105	106½
Utica Gas & Elec., 8% com.	200	....	....
Utilities Pwr. & Lt., 7% pf.	95½	93	100
Utilities Pwr. & Lt., com. A $2.	31½	27	34
Utilities Pwr. & Lt., com. B $1—no par.	20½	13½	21½
VERMONT HYDRO-ELEC., 7% pf.	90	95	100
Virginia Elec. & Pwr., 7% pf.	m108	105	110
Virginian Pwr., 7% pf.	i108	....	....
Virginian Pwr., com.	75	....	....
WAGNER ELEC., 7% pf.	b 86½	68	90
Wagner Elec., com.—no par.	b 30	18½	39½
Washington Ry. & Elec., 5% com.	f370	....	....
Washington Ry. & Elec., 5% pf.	f 97½	....	....
Washington Wtr. Pwr., 8% com.	174	136	182
West Penn Elec., 7% pf.	112	102	112½
West Penn Elec., Cl. A $7.	107	97½	110
West Penn Pwr., 7% pf.	116	111	118
West Penn Pwr., 6% pf.	108	100½	108½
West Virginia Lt., Ht. & Pwr., 7% pf.	92	94	96
West Va. Utilities, 7% pf.—50.	m 90	48	51½
Western Pwr., 7% pf.	k103	98	101½
Western States Gas & Elec., 7% pf.	i104	96	105
Western States Gas & Elec., com.	m 38	....	....
Westinghouse Elec. & Mfg., 8% com. —50.	88½	67½	89½
Weston Elec. Instrument, Cl. A $2 —no par es.div.	30½	30	34½
Weston Elec. Instrument, com.—no par.	14	11	18½
Wheeling Elec., 6% pf.	102	95	104
Worthington Pump, 7% pf. A.	k 50	46	61½
Worthington Pump, 6% B.	42	40	54½
Worthington Pump, com.	m34	20½	46
YALE & TOWNE com. $5—25.	k 80	70½	84½

Stock Exchange: *a*Chicago; *b*St. Louis; *c*Philadelphia; *d*Boston; *e*Baltimore; *f*Montreal; *g*Cincinnati; *h*San Francisco; *i*Pittsburgh; *j*Washington. *k*Bid price Saturday, Oct. 1. *l*Bid price Wednesday, Oct. 5. *m*Latest quotations available. †Dividend rate variable.

Wyman Outlines Central Maine Development

Addressing stockholders in his quarterly letter dated Oct. 1, President Walter S. Wyman of the Central Maine Power Company pointed out that operations during August, 1927, were the best in the company's history for that month of the year, both as to gross and net, and that nearly 50 per cent more energy was generated than in August, 1926. When the Gulf Island hydro-electric development, which was built to its ultimate rating, was completed less than a year ago, it was believed that it would take from two to four years to sell the output of the plant, but the growth of new industries and increased use of power by old customers indicate that the output of Gulf Island will be sold by July, 1928, with the exception of a considerable amount of secondary power. An increased amount of energy has been sold the Cumberland Power & Light Company, and it is expected that a contract recently signed with the Lawrence Portland Cement Company, Rockland, Me., whose plant is being built at a cost of several million dollars, will add about $125,000 to the company's 1928 business.

During the past summer many rural line extensions have been undertaken, and by Nov. 1 the company will have built about 137 miles of rural lines, serving about 646 customers. Mr. Wyman stated that the New England Public Service Company has acquired virtual control of the Edwards Manufacturing Company at Augusta, which owns hydraulic power facilities on the Kennebec River now running to waste. It is believed that the acquisition will be mutually beneficial to the Edwards and Central Maine companies.

Attractions of Utility Preferreds

The present attractions of public utility preferred stocks, in view of the declining yield to be secured from bonds, are briefly discussed by Stone & Webster and Blodget, New York, in the October investment circular of this house. Investors are becoming more and more interested in preferred-stock issues, the circular asserts, and it goes on to say:

The fundamental test of value in this field of investment is adequacy and stability of earning power. Public utility preferred stocks are particularly attractive in this regard. They also offer comparatively large returns, and many issues are beginning to enjoy active markets. Well-established and conservative institutions that are permitted to buy stock issues are giving increasing attention to public utility preferreds.

One of the important features of preferred stocks, and one frequently overlooked, is their comparative attractiveness from a tax standpoint. Preferred stocks are exempt from normal federal income tax. In the case of individuals having a net taxable income in excess of $8,000 annually, the normal federal income tax rate is 5 per cent, exemption from which means a marked increase in net return. For instance, under the 5 per cent normal federal income tax schedule a preferred stock yielding 5.85 per cent offers as large a net return as a bond yielding 6 per cent with a 2 per cent tax-free covenant.

The attractive feature of preferred stocks from the tax standpoint should particularly appeal to corporations, inasmuch as preferred stock dividends are exempt from the 13½ per cent federal corporation income tax. In the case of a corporation, a preferred stock yielding 5.25 per cent offers a larger net return than a bond yielding 6 per cent.

EAST COAST UTILITIES COMPANY INCREASES CAPITAL.—The East Coast Utilities Company on Aug. 9 filed a certificate at Dover, Del., increasing its authorized common stock from 2,500 shares of no par value to 12,500 shares of no par value, and the preferred stock from $250,000 to $2,000,000, par $100.

NEW CAPITAL SET-UP FOR WESTERN NEW YORK UTILITY COMPANIES.—The certificate of consolidation made a part of the petition for the consolidation of the Niagara, Lockport & Ontario Power Company and the Western New York Utilities Company, Inc., under the name of the former, states that the new corporation is to have 827,500 shares of stock, of which 500,000 shares will have a par value of $25 a share and 327,500 shares no par value, the 500,000 shares to be preferred stock and the 327,500 common stock. Holders of the preferred stock, par value $100, of the Niagara, Lockport & Ontario Power Company are to receive under the proposed consolidation four and two-fifths shares of the preferred stock of the new company. Preferred stockholders of the Western New York Utilities are to receive $2.50 in cash and four shares of the preferred stock of the new company and accrued interest for each share of the preferred stock, par value $100. Holders of the 300,000 shares of common stock of the Niagara, Lockport & Ontario Power Company and of the 27,500 shares of common stock of the Western New York Utilities Company are to receive common stock of the new company, without par value, for each share surrendered in the two companies.

Customer-Ownership Sales of Stock $11,200,000 in July

According to statistics received by the ELECTRICAL WORLD from companies taking part in customer-ownership campaigns, it is estimated that during July 243,000 shares of stock were sold, having a value of $11,200,000, in 15,500 transactions. Of this amount, somewhat over $4,000,000 was in the form of twenty-five-dollar shares, the rest being sold at a price averaging very close to $100 per share.

Although this estimate may be modified somewhat upon the receipt of reports from a number of companies which were not in hand at the time the compilation was made, it is clear that there was a marked reduction in this form of financing as compared with June of the current year and with July of recent years. One company selling $5,000,000 worth of stock in June sold none in July. Total sales of a definite group of companies serving over 11,000,000 customers, which in June amounted to about $18,000,000, in July dropped to only a little over $10,000,000. A similar decrease took place in the number of shares sold and in the number of transactions.

Diesel Engines in Danish Stations

Danish government statistics for the fiscal year 1925-26 show nearly a quarter million horsepower of prime movers in central stations in that country. One-third of this was in the three chief urban systems. Classified as to type, steam turbines account for half the total, Diesel engines for more than a full third: water power is scarce. The report of 652 hp. in wind-driven stations is unique.

248,404 Hp. in Danish Central Stations, 1925-26

Locality Served or Kw.-Hr. Output	Horsepower of Prime Movers								Generators		
	Steam Turbines	Steam Engines	Diesel Engines	Producer Gas	Waterwheels	Wind Motors	Other	Total	D.C. Kw.	A.C. Kva.	Total Kva.
Three chief city systems.....	74,700	8,310	.....	....	....	..	....	83,010	6,100	60,350	66,450
5 to 20 million kw.-hr.....	45,113	600	13,060	....	6,300	..	....	65,073	13,850	49,655	63,505
1 to 5 million kw.-hr.....	5,625	1,610	29,195	648	3,835	..	....	40,913	15,619	25,955	41,574
0.2 to 1 million kw.-hr.....	.....	1,080	21,109	1,913	365	..	98	24,565	14,777	4,775	19,552
Less than 0.2 million kw.-hr.....	.....	.....	7,400	315	375	..	125	8,215	5,057	669	5,726
Total urban and regional	125,438	11,600	70,764	2,876	10,875	..	223	221,776	55,403	141,404	196,807
Rural central stations.....	.....	115	18,558	3,175	2,059	652	2,069	26,628	*	*	*
National total	125,438	11,715	89,322	6,051	12,934	652	2,292	248,404	.....	.....	.....

* Not given.

Business News and Market Conditions

Standards Committee Considers Proposals

Standards for Welding Apparatus and Specifications for Mercury-Arc Rectifiers Receive Committee Attention

STANDARDS for electric arc and resistance welding apparatus have been submitted to the American Engineering Standards Committee by the American Institute of Electrical Engineers as a basis for national standards on these subjects. The standards submitted include nomenclature, methods of making dielectric tests and methods of rating, to be used as a basis of guarantee for the following types of apparatus used in electric and resistance welding operations: Direct-current generators, motor-generator sets, transformers, resistors and apparatus for electro-percussion welding. Butt, flash, pressure-contact, spot and seam welding are differentiated. The proposal of the Institute, which is of importance to several organized industrial groups, including the Association of American Steel Manufacturers and the American Welding Society, has been referred to the electrical advisory committee for study and recommendation to the A.E.S.C.

A sectional committee is to be organized for the preparation of national specifications for mercury-arc rectifiers under the procedure of the American Engineering Standards Committee. The work, which will include definitions, service conditions, load limitations, power factor, heating, short-circuit limitations, dielectric tests, insulation resistance, voltage regulation, efficiency and rating, is to be undertaken as a result of requests of the American Railway Association and the American Institute of Electrical Engineers. The latter will serve as sponsor for the sectional committee.

Standard values for the electrical and related constants of hard-drawn aluminum conductors have recently been approved by the A.E.S.C. for commercial use. The need of such a national standard had arisen from the extensive use of aluminum for transmission lines and other electrical purposes. The standard was drawn up by a sectional committee under sponsorship of the American Institute of Electrical Engineers. The subject is one which has been considered by the International Electrotechnical Commission as a basis of international agreement along the lines of the well known "copper standards." The American standard for the conductivity of aluminum is appreciably higher than used in some of the foreign countries.

The following matters have been referred by the American Engineering Standards Committee to its electrical advisory committee for investigation and recommendations:

1. Rotating Machinery Standards.—A group of four standards of the A.I.E.E. dealing with large-power direct-current apparatus, large-power motors and generators with fractional-power motors, and five standards of the National Electrical Manufacturers' Association, are now before the A.E.S.C. The electrical advisory committee has been requested to work out an administrative method of unifying these machinery standards. This involves the question of sponsorship.

2. Safety Code for Electrical Power Control.—A careful study of the question of the need for a separate code with the scope as originally outlined has been made by the members of the former Electrical Safety Conference (dissolved Aug. 1, 1927) and the electrical advisory committee. It has been agreed that it is preferable to abandon the idea of a separate code, and recommendations are now being prepared for submission to the A.E.S.C. to distribute the fields intended for this code between the National Electrical Code, the National Electrical Safety Code and the codes for which the Underwriters' Laboratories are responsible.

The sub-committee has suggested the following:

1. That the A.E.S.C. requests the sectional committees for Parts 1 and 3 of the National Electrical Safety Code and the sectional committee for the National Electrical Code to give appropriate attention to provisions in the five standards of the Electrical Safety Conference relating to installation features with a view to taking appropriate action so that such of these provisions as are acceptable and are not already incorporated in the respective codes will have a proper place therein.

2. It is recommended that the A.E.S.C. request the Underwriters' Laboratories, as sponsor for a project covering standards and specifications for performance and inspection with reference to fire and casualty hazards, etc., to give due consideration to each of these five standards with a view to incorporating in individual standards, eventually to be presented for A.E.S.C. approval covering detailed appliances, such provisions in the Electrical Safety Conference standards as are appropriate to these new standards of the Underwriters' Laboratories.

3. It is recommended that the office of the A.E.S.C. be instructed to advise the American Institute of Electrical Engineers and the National Electrical Manufacturers' Association of the desirability of keeping in mind these particular standards of the conference with a view to having appropriate performance and design features therein incorporated in any new standards or revision of existing standards which may now or later be in preparation for submission to the American Engineering Standards Committee.

3. The approval of rating paragraphs of the A.I.E.E. standard No. 9 on induction motors and induction machines in general.

4. Electric Arc and Resistance Welding Apparatus.—The question of sponsorship for standards on these subjects.

The electrical advisory committee is composed at present of two representatives each of of the American Institute of Electrical Engineers, the electric light and power group and the National Electrical Manufacturers' Association, and one representative each of the American Electric Railway Association, the American Railway Association, the American Society for Testing Materials,

Imports of Electrical Apparatus Into United States by Commodity and by Country of Origin January-June, 1927

(Data furnished by the Bureau of Foreign and Domestic Commerce)

Article	First Quarter	Second Quarter
Carbon-filament incandescent electric lamps:		
Miniature	$16,324	$59,858
Other lamps	254,407	137,723
Metal-filament incandescent electric lamps:		
Miniature	19,901	4,642
Other lamps	70,753	35,428
Other electric lamps, including neon, etc.	1,375	6,440
Generators	210	....
Transformers	.....	3,437
Converters, double-current and motor-generators, dynamotors and other converting apparatus	147	....
Switches, circuit breakers, fuses, choke coils, reactors, sockets, plugs, etc.	1,438	1,594
Motors, stationary, railway, vehicle automotive, and other	6,104	2,218
Electric fans and blowers	32	26
Table household, kitchen and hospital utensils and similar hollow or flat ware containing electrica heating element:		
Electric flatirons	17	143
Iron or steel-enameled or glazed wit vitreous glasses	149	425
Copper, brass, steel or other base metal	1,416	456
Industrial electric furnaces and ovens	.....	345
Therapeutic apparatus and X-ray machines	797	1,535
Radio and wireless apparatus and parts	10,198	119,688
Telegraph apparatus	2,226	58
Telephone apparatus	184	251
Storage batteries and parts	2,773	1,642
Batteries other than storage	106	5
Electrical machinery and parts	288,714	433,114
Electric apparatus and parts	19,192	51,209
Total	$696,463	$860,237
Country		
Austria	$77,527	$5,434
Australia	4	....
Belgium	1,218	303
Brazil	10	8
British West Indies	10	....
Canada	5,440	11,261
Ceylon	7,423	....
China	3,401	....
Cuba	256	3
Czechoslovakia	13,316	263
Denmark	.....	228
France	12,013	18,982
French Oceania	.....	90
Germany	187,790	195,050
Hungary	1,530	....
Italy	562	1,300
Japan	105,848	153,895
Mexico	260	....
Netherlands	937	430
Norway	.....	33
Rumania	4	....
Spain	120	58
Sweden	56,025	78,133
Switzerland	198,433	261,412
United Kingdom	14,336	133,354
Total	$696,463	$860,237

the fire protection group, the United States Bureau of Standards, the Navy Department and the War Department. Provision has been made for inclusion of other industrial or technical organizations desiring representation.

National Program for Regional Commercial Surveys

John M. Hager of the Department of Commerce, director of market surveys for domestic commerce, has returned from a second extensive trip into the West and Middle West in connection with the national program for carrying out a commercial survey of the entire country by regions. The United States has been divided into regions based on homogeneity in fundamental economic factors. In reality this country consists of definite economic provinces, which, though overlapping, may be outlined on the basis of topography, climate, natural resources, population, prevailing agriculture, local development of industry and trade, and peculiarities of purchasing power and buying habits. Each of these areas contains fundamental and underlying conditions influencing trade and commerce which is the object of these surveys to determine, examine and interpret. When the nine surveys contemplated have been completed the Department of Commerce will have a mosaic picture of the commercial structure of the United States, the interdependence of the various provinces and the movement of commodities in interchange between them. The "Commercial Survey of the Southeast," covering one of the areas, is to be released soon. Other surveys in various stages of progress are for New England, the Pacific Southwest and the Middle West.

Manufacturers Adopt National Platform

The American industry committee of one hundred called together by the National Association of Manufacturers recently adopted fourteen planks for incorporation in a national platform to be submitted to both the Republican and Democratic parties next year. The planks are (1) government business, (2) taxation, (3) regulation of combinations, (4) employment relations, (5) transportation, (6) immigration and naturalization, (7) international relations, (8) tariff, (9) foreign trade policies, (10) merchant marine, (11) Federal Reserve bank system, (12) waterways development, (13) flood control, and (14) agriculture. These fourteen planks will be drawn by as many sub-committees working under a general drafting committee of eleven men from various parts of the country. The drafting committee which was appointed consists of William Butterworth, president Deere & Company, Moline, Ill., chairman; George M. Verity, president American Rolling Mills, Middletown, Ohio; Newcomb Carlton, president Western Union Telegraph Company, New York; W. B. Baker, president Atlantic Ice & Coal Company, Atlanta; A. T. Waterfall, vice-president Dodge Brothers, Detroit; E. E. Loomis, president Lehigh Valley Railroad, New York; John H. Puelicher, president Marshall Ilsley Bank, Milwaukee; A. H. Milliken, president Pettibone-Milliken Company, Chicago; Sidney J. Jennings, president United States Fuel Company, Utah; Allen R. Mitchell, Jr., Allen R. Mitchell Company, Philadelphia, and Frederick C. Hood, president Hood Rubber Company, Watertown, Mass.

James A. Emery, general counsel of the association, will act as counsel to the various committees. The American industry committee will probably hold other meetings through the winter for the consideration of any additional planks that it may feel advisable to introduce in the light of new issues of national importance that may arise.

McGraw-Hill Issues Directory of Manufacturers

The McGraw-Hill engineering catalog, which includes a complete classified directory of the manufacturers serving the field, together with a section of tabular buying data, has just been issued by the McGraw-Hill Catalog & Directory Company, Tenth Avenue at 36th Street, New York. The new volume combines under one cover the standardized condensed catalogs of more than 200 manufacturers serving the electrical engineering field. The catalog is being distributed among the electrical engineers and other buying and specifying officials of central-station companies, electric railway companies, industrial plants and electrical jobbers who are large purchasers of equipment and supplies for electric generation, transmission or utilization purposes.

Market Conditions

THE fall business outlook is excellent according to reports from all quarters, especially the Southeast and New England. The Middle and South Atlantic States and Middle West report no large orders but say that the total sales volume is very satisfactory. One mail-order house in Chicago reports the best business on record, and temporary settlement of the coal situation and a healthy agricultural condition augur well. From the Pacific Coast come signs of awakened mining and lumber activity, with a decided increase in motor buying by industries in the Northwest. In the Southeast utilities are buying considerable service equipment and mills are running overtime. New England shows a varied class of buying. During the past year one utility group purchased about $450,000 worth of domestic appliances. The New England Telephone Company is planning to spend $1,450,000. While the tornado depressed business in St. Louis, every one is optimistic concerning a speedy recovery, and reconstruction will require additional electrical equipment and wiring supplies.

Metal Sales Improve—Copper and Tin Up

Sentiment in the non-ferrous metal market is better than last week. Zinc has sold in the largest volume for a long time, though at slightly lower prices. Copper and tin, on the other hand, improved somewhat in price, with fair sales. Lead has continued steady at practically unchanged quotations. The interests that were selling copper for several days at 13 cents, delivered at usual Eastern points, advanced their price on Monday to 13⅛ cents, since when a fair amount of business has been done at that level. On Oct. 5 a slight further improvement was made. The large majority of sellers are at 13¼ cents, as they have been all along. Business has been better than last week, but is still below normal. Most of the demand has been for fairly early delivery.

NEW YORK METAL MARKET PRICES

	Sept. 28, 1927 Cents per Pound	Oct. 5, 1927 Cents per Pound
Copper, electrolytic	13	13.20
Lead, Am. S. & R. price	6¼	6¼
Antimony	10¼	11
Nickel, ingot	35	35
Zinc spots	6.425-6.45	6.35
Tin, Straits	58.625	58.75
Aluminum, 99 per cent	26	26

Base copper price Sept. 28, 1927, 15½ cents.

An improved foreign demand is perhaps the most favorable development of the week in copper.

The American Smelting & Refining Company continues its official contract price for New York lead at 6.25 cents, and the prevailing quotation in St. Louis has been 6 cents all week, though in exceptional cases a slightly higher price has been obtained. Many are inclined to believe that the bottom has been reached.

At present prices Mexican ore lead must enter the domestic market and bullion lead must go abroad. Unless London drops enough to alter this situation, it is not likely that the domestic price will be reduced. Though no material reduction in rates of output has as yet appeared in the statistics, reports from several mining regions indicate that mine production has been curtailed and that a corresponding decline in smelter production should develop eventually.

New England Sales Reported Steady

During the past week sales in New England kept up in good volume, although few outstanding orders are noted. One manufacturer received an order from western Massachusetts for two waterwheel generators; central-station equipment is moving quite well, and prospects for the last quarter are very encouraging. Small motors continue to sell well; arc-welder sales reached a good level in September and are attracting considerable attention; one order for a special electric repair and construction truck, amounting to about $10,000, is recorded, and schedule material is moving in good quantity. Little change is noted in the demand for new construction material, though many projects are closing up. Appliance sales reported by one group of utilities amount to about $450,000 for the year ended Oct. 1, which shows about 6 per cent increase over the sales for a corresponding period last year.

A number of large wiring contracts are yet to be placed, one of $25,000 for a Malden (Mass.) schoolhouse being noted. The New England Telephone & Telegraph Company plans to spend about $1,450,000 in this district during the last quarter, mainly on line extensions; the New England Power Company will carry through construction of a new substation in Wamesit, Mass., and the town of Temple, N. H., is interested in introducing electric light and power, the Temple Light & Power Company having been formed for this purpose.

Sales Quiet, Inquiries Fair in New York Territory

Sales to central-station companies in the New York district have been quiet during the past week. While a fair amount of inquiries are being received, no important projects are announced. Some manufacturers report a slight improvement in sales last month over the previous month, but there is a general decrease reported in comparison with September last year. Motor sales continue good, and some sales of transformers to industrial buyers are reported this week. The demand for control apparatus is a little stronger than it has been for some time. Jobbers are finding a fair market for appliances, but conduit, fittings, etc., are spotty.

No Large Orders in Southeast, but Fall Prospects Excellent

The volume of electrical business in the Southeast for the past week has been satisfactory, but no individually large orders were placed. Central-station orders for transformers, meters and street lighting are picking up, and indications for the fall business are excellent. One power company ordered last week $3,000 worth of distribution transformers and $2,300 worth of house-type meters. Another utility ordered creosoted pine poles and pole-line hardware totaling $4,000, while a cable order for lead-covered cable amounted to $3,500. Orders from municipalities are reasonably satisfactory, one Georgia town last week ordering switching equipment amounting to $2,500.

Industrial activities in this section are good, with many mills running overtime. Good orders are being placed for motor equipment, though none of these orders is individually large. The number of inquiries is also very good. One industrial order placed last week called for inside-wiring materials amounting to $2,000 for a Georgia job. A textile mill in Georgia has recently signed a power contract covering an addition to plant, and electrical materials involved in the construction of this addition will amount to approximately $12,000.

Middle West Has Good Month

September 30 closed a good month in the Middle West, with most lines showing an increase. The outlook for fall business is good. The temporary settlement of the coal situation no doubt will help business materially, particularly in southern Illinois. Agricultural districts are in good condition according to one large mail order house, which declares that in volume of sales September was the largest month on record. Railroads are in good shape and conditions are improving generally. Utility companies are busy with the seasonal increase of business. Considerable purchasing of apparatus is going on, although the average purchases per day for one large utility company fell off a trifle, running about $55,000. Among the interesting items ordered this week were the following: Forty-four 600-amp. and nineteen 1,200-amp. bushings for wall mounting; main steam piping, reheat steam piping with valves and appurtenances valued at $75,000, one hundred relays with 24-volt direct-current operating coils and a 50,000-cu.ft.-per-minute rotary air filter.

Jobbers' sales are slightly larger than during August, and better business is anticipated. Toasters and waffle irons will be featured in October. Prices remain generally firm.

St. Louis Business Optimistic Despite Tornado

The tornado which swept through the residence part of St. Louis last week had a depressing effect on all lines of business, but when the work of reconstruction is fairly started there will be an immense demand for construction materials of all kinds as well as for electrical workers. An ELECTRICAL WORLD editor who visited the devastated area around St. Louis found that only two electrical manufacturers suffered any material damage and these manufacturers were overcoming all obstacles to immediate resumption. Restoration of crippled utility service is well under way. Estimates place the cost to railway, telephone and electric companies at $1,250,000. Manufacturers report business in good volume. Inquiries indicate an upward trend of sales. Profits are declared inadequate owing to competition. An optimistic attitude is distinctly prevalent. Two contracts from the southwestern part of the St. Louis district include a small station switchboard costing $3,200 and a lot of lighting units amounting to $4,500.

Motor Sales Active in Northwest

Motor buying around Seattle showed a decided increase last week, with indications of continuance well into the late fall. Sales include 20, 30, 15 and 10-hp. motors to a pulp and paper mill; 50, 20, 15, 10 and 7½-hp. units to a lumber mill and about 25 units, mostly 1-hp., 2-hp. and 3-hp., to apple orchards. On Oct. 15 the St. Paul & Tacoma Lumber Company will buy 40 motors of from 250 hp. down for its new hemlock mill, and, within eight weeks, orders will be placed for approximately 200 motors of from 300 hp. down for pulp mills in Port Townsend and Hoquiam. The contract for boring the Bridge River tunnel of the British Columbia Railway Company's hydro-electric development, near Vancouver, has been awarded to Pacific Engineers, Ltd., Vancouver, for $1,249,530. The city of Seattle last week awarded contracts for 10,000 cross-arms, 108 insulators, one short-circuit-calculating table, wire rope, sheaves and sheave supports, etc., valued at approximately $25,000. Specifications are reported as being written for machinery and electrical equipment for the proposed paper plant in Kelso, to which a pulp mill will later be added.

Mining and Lumbering More Active on Coast

Awakened mining activity is evidenced in the Far West by many varied and widespread orders such as one for $7,500 worth of transformers, wire and cable for a Sierra copper mine; another for three 75-kva. transformers for a northern California mine, and a third, totaling $1,500, for 30 per cent Para cable for a gold-dredging company, besides miscellaneous wire and supply orders of about $1,000 each. Lumber companies, too, are actively purchasing, their orders being such as $3,500 worth of supplies and small machinery for the Redwood area, a two-thousand-dollar switchboard for the same belt and a miscellaneous order valued at $6,500 from the Sierras for relays, compensators and eight motors of 3 hp. to 50 hp. Other industrial orders include a panel and controller at $2,400, two storage-battery locomotives, two motors totaling 275 hp. and a 300-kw. turbo-generator. San Francisco jobbers' orders include 500 trickle chargers, valued at $4,500, and 200 ranges. The present call is largely for more expensive ranges with white-enamel finish and trash burners. Power company business is quieter, but includes orders for a large number of poles, such as one for 200 butt-treated 7-in., 35-ft. poles and two carloads each of 8-in., 40-ft., and 7-in., 35-ft. poles untreated.

Activities of the Trade

Robbins & Myers Announce Changes in Organization

Changes in the organization of the Robbins & Myers Company, Springfield, Ohio, have been announced as follows: W. S. Quinlan of Cleveland succeeds F. S. Hunting as president of the company. Mr. Hunting has been made chairman of the board of directors. C. A. Stirling, formerly with the home office of the company and later general manager of the Canadian plant and more recently New York district manager, has been appointed general sales manager with offices at Springfield; J. P. Lafferty, at one time connected with the motor sales department at Springfield, later on connected with the Chicago office and more recently St. Louis district manager, has been appointed New York district manager to succeed Mr. Stirling; R. C. Decker, formerly of the New York office and lately Cincinnati district manager, has been transferred to St. Louis as St. Louis district manager, succeeding Mr. Lafferty, and C. W. Stoll, formerly of the motor sales department of the home office and later connected with the St. Louis office, has been transferred to Dallas, Tex.

Carbon-Brush Simplification

On Sept. 29 the standing committee appointed by the Department of Commerce for the simplification of carbon brushes and brush shunts met and agreed upon a proposed revision of simplified practice recommendation No. 56. This revision is now being written and will be forwarded to the Department of Commerce for circularization within the next few days, according to E. A. Williford, manager carbon sales division, National Carbon Company, Inc.

Westinghouse Expands Electric Welding School

The great demand for welder operators has caused the Westinghouse Electric & Manufacturing Company to expand its welding school, at which an intensive training course covering a month has been given. It has been decided to lengthen the course to three months and to double the enrollment. The course will also be open to students of the Westinghouse technical night school.

The welding committee, which has charge of the school, is also extending its activities in other directions and will make a wide study of welding applications to all classes of Westinghouse apparatus, as well as a study of welding machinery with an idea of improving it, and will specially consider arc welding as applied to steel-frame structures. J. R. Weaver, assistant superintendent of the equipment department, is chairman of the committee, which includes W. H. Hines, mechanical engineer; A. M. Candy, general engineer; G. W. Goebel, chief inspector; W. W. Reddie, motor apparatus sales; C. C. Brinton, manufacturing engineer, and P. E. Henninger, superintendent tool department.

THE AUTOMATIC ELECTRIC HEATER COMPANY, 1505 Race Street, Philadelphia, is now offering a cabinet water heater to fit any standard size oven-type range and which is particularly adapted to homes where electric ranges are already installed.

THE GRAYBAR ELECTRIC COMPANY, Graybar Building, Lexington Avenue and Forty-third Street, New York, has made tentative plans to erect a new plant to house the proposed Rochester distributing station, which will be the sixty-fourth in the United States. Initial plans call for a floor space of 14,000 sq.ft.

THE ILERITE MANUFACTURING COMPANY, manufacturer of insulated live-line testers and other electrical devices, recently organized by George Arthur Iler and associates, has taken over a building at 5103 Lakeside Avenue., N. E., Cleveland, where manufacturing activities will start as soon as alterations have been completed.

THE UNION METAL MANUFACTURING COMPANY, Canton, Ohio, is completing a large extension to its present factory building as well as an entirely new building which is 60 ft. x 340 ft. The extension to the present building will provide additional facilities for turning out larger volumes of pressed steel ornamental lamp standards. The new building will house special machinery for the production of the new type heavy duty fluted steel trolley poles which recently have been announced by the company.

CURTIS LIGHTING, INC., Chicago, manufacturer of "X-Ray" reflectors, announces a new weatherproof 250-watt floodlighting projector, the "X-Ray Star" No. 25.

THE JAMES R. KEARNEY CORPORATION, St. Louis, Manufacturer of overhead and underground utility equipment, announces the following changes in its sales organization: A. F. Zerbst has been appointed representative in Florida, Georgia, Alabama, North Carolina, South Carolina and part of Tennessee; Oscar Marcusen, in parts of New York, Ohio and Kentucky; Henry M. Hughes, in parts of Pennsylvania, West Virginia and Ohio; A. W. Marshall in parts of Kentucky and Indiana, and J. G. Smith, in all of Canada west and north of Port Arthur with headquarters in Winnipeg, Manitoba. The company also announces that H. C. Fiske has been transferred to the Chicago territory and that E. J. DeRight is now covering parts of Missouri, Arkansas, Mississippi, Tennessee, Kentucky and Illinois.

THE HAYS CORPORATION, Michigan City, Ind., manufacturer of combustion instruments, announces the appointment of the following representatives: the S. Thomas Engineering Company, 6625 Delmar Boulevard, St. Louis, for eastern Missouri and southern Illinois; J. H. Spurgeon, 3-224 General Motors Building, Detroit, for eastern Michigan and northwestern Ohio; H. R. Johnson, 621 New York Life Building, Minneapolis, for Minnesota and the Dakotas, and the Louis Towner Construction Company, 551 Valley Avenue, N. W., Grand Rapids, Mich., for Grand Rapids and contiguous territory.

THE AMERICAN ENGINEERING COMPANY, Philadelphia, manufacturer of the "Taylor" stoker, "Lo-Hed" electric hoists, etc., announces that its "Lo-Hed" hoist division has appointed D. A. Polhemus representative in the territory including western Pennsylvania, West Virginia and counties along the eastern border of Ohio with offices in the Oliver Building, Pittsburgh. John Kaiser will assist Mr. Polhemus. W. C. Minier has also been appointed to cover northern Ohio, except for territory surrounding Toledo, and is located at 2195 Bellfield Avenue, Cleveland.

THE GENERAL ELECTRIC COMPANY has received an order from the State Line Generating Company, Chicago, for a storage-battery locomotive weighing 110 tons and capable of hauling a 1,500-ton train, for service in its yards at Hammond, Ind. The battery was furnished by the Electric Storage Battery Company of Philadelphia.

THE TRICO FUSE MANUFACTURING COMPANY, Milwaukee, announces an improvement in its ferrule-type renewable fuses. The time spent in renewing is said to have been reduced and all small loose parts have been eliminated.

THE BALDOR ELECTRIC COMPANY, 4353 Duncan Avenue, St. Louis, had its plant damaged by the tornado last week. The office was destroyed and the winding and assembly departments were also damaged. E. Ballman, president of the company, stated that production at the Bloomington plant had been increased to meet the demand. Work on rehabilitating the damaged plant was well under way on Tuesday, Oct. 4, and the company planned to be in production by the end of the week, provided that power service was re-established.

PASS & SEYMOUR, INC., Solvay Station, Syracuse, N. Y., manufacturer of porcelain and electrical supplies, announce the following appointments: Calder C. Downie, who has been manager of the Southern territory, has been appointed assistant to the general sales manager and will be located at Syracuse; Carroll Schoen will represent the company in the states of Maryland, Virginia, North Carolina and South Caro-

lina; Stanley D. Whitford, formerly in charge of sales in the New England states, has been transferred to Pittsburgh and will take charge of the Pittsburgh district of the Philadelphia territory, and Alva D. Stein, manufacturers' agent, with headquarters at 156 Purchase Street, Boston, will represent the company in the New England states.

BUSSMAN MANUFACTURING COMPANY, 2536 University Avenue, St. Louis, manufacturer of bus fuses and portable lamps, had its Sullivan Avenue plant damaged in the tornado last week. The company started rebuilding on the same day, and on Tuesday of this week the plant was again in production.

THE ROLLER-SMITH COMPANY, 233 Broadway, New York City, manufacturer of instruments, relays and circuit breakers, announces the appointment of the D. H. Braymer Equipment Company, W.O.W. Building, Omaha, Neb., as its representative for Nebraska and western Iowa.

THE AMERICAN ENGINEERING COMPANY, Philadelphia, announces the appointment of George L. Drake as agency sales supervisor for its "Lo-Hed" hoist division.

THE WORTHINGTON PUMP & MACHINERY CORPORATION, 115 Broadway, New York, has centralized its Diesel-engine building activities in its improved Snow works at Buffalo, through the discontinuance of the Blake & Knowles works at Cambridge, Mass.

CONNERY & COMPANY, Second Street above Erie Avenue, Philadelphia, manufacturer of breechings, uptakes, air ducts, etc., has recently completed and has in operation an addition to its manufacturing plant comprising a two-story factory building having approximately 50,000 sq.ft. of floor space, which will increase its capacity approximately 50 per cent.

THE SAFETY CABLE COMPANY announces that Edward W. Kearns, for many years active in the wire and cable industry throughout the Middle West, assumed charge of its Chicago office as central district manager on Oct. 1.

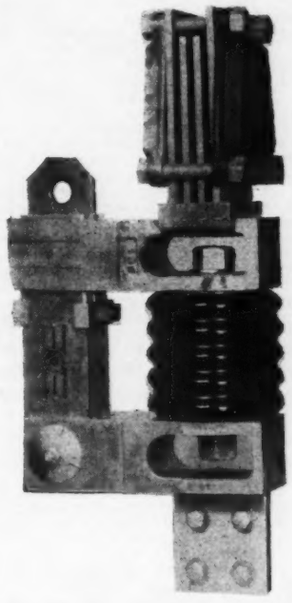
THE ELYRIA IRON & STEEL COMPANY, Cleveland, has changed its name to Steel & Tubes, Inc. The company manufactures welded steel tubing and cold-rolled strip steel, so that the new name better indicates its present line of products. The company recently acquired the Brooklyn (N.Y.) plant of the Mohegan Tube Company, the name of which has been changed to the Steel & Tubes Company of New York.

THE ELECTRIC ARC CUTTING & WELDING COMPANY, 152 Jelliff Avenue, Newark, N. J., announces that the Seneca Electric Welder Sales Corporation, and the Weldrite Company, both of Detroit, as well as Welding Service, Inc., San Francisco, have taken out a license under the Holslag-Arendt patents. The Gibb Welding Machine Company, Bay City, Mich., and the Allan Manufacturing & Welding Company, Buffalo, formerly licensed under the Holslag patents, are also included in a license under this joint license arrangement. The Owen Electric & Manufacturing Company, Fayetteville, N. C., and the Electric Arc Cutting & Welding Company, the owners of the patents, are also licensed.

New Equipment Available

High-Capacity Disconnecting Switch

A 2,000-amp., 7,500-volt disconnecting switch, designed to clamp directly on the bus and offering a convenient method of inserting a disconnecting



OIL-CIRCUIT-BREAKER DISCONNECTING SWITCH FOR CLAMPING DIRECTLY ON THE BUS

switch between the oil circuit breaker and the bus, has been developed by the Delta-Star Electric Company, 2400 Block, Fulton Street, Chicago. The contact terminals are designed to take flat or round conductors as required by local conditions. This type of "disconnect" is claimed by the manufacturers to insure a good space factor and is a short run to the oil circuit breaker terminal. The insulator unit is the same as used with the insulators of standard bus supports and disconnecting switches and is interchangeable with them. If for any reason the insulator unit should be broken, it can be easily removed and a new one inserted in a few moments. When desired, the switches are provided with positive locks.

High-Speed Hoist

The "Quick-Lift," an all-steel quarter-ton, high-speed electric hoist, has been placed on the market by the American Engineering Company, Philadelphia. The hoist has a pressed steel frame, chrome-manganese steel is used in the gears and shafts, and ball bearings, non-spinning hoisting rope, oil bath lubrication, push button control and upper and lower limit switches are the features pointed out by the manufacturer. All working parts are fully inclosed. The hoist weighs 200 lb. and is made in two types—plain trolley and hook suspension. The plain trolley type requires 16-in. headroom and 18 in. is required for the hook suspension type.

Machines for Undercutting Mica

Two machines for undercutting mica between commutator segments of railway motors have been introduced recently by the General Electric Company. One is a portable outfit which can be moved readily to any part of the shop and clamped to the armature shaft and the other meets the requirements of large railways for a stationary shop tool. The portable outfit has adjustable stops which limit the travel of the saw to the brush surface of the commutator and is equipped with a floating drive shaft which permits the grooving of a number of slots at one setting of the armature. It also has an angular adjustment to compensate for commutator bars not exactly parallel to the shaft.

The stationary machine has a base which is provided with adjustable pillow blocks having V-shaped bearing surfaces with brass rollers for carrying the armature. Both vertical and angular adjustments are provided, the latter adjustment to be used where the commutator bars are not exactly parallel to the shaft. The circular saw is mounted on the end of the motor shaft, and is supported by an offset bearing, which permits the grooving of commutators having ears. Hand scrapers are designed and shaped to remove the fins on the mica insulation, also burrs and sharp corners on segments which are left in the grooves by the slotting machine.

PORTABLE INSTRUMENT. — The "Master" portable instrument placed on the market by the Jewell Electrical Instrument Company, 1650 Walnut Street, Chicago, is said to have a 17 per cent longer hand-drawn scale than on any portable instrument of the same size, a reinforced molded black bakelite case, a large-sized movement, a large-scale opening closed by non-shatterable glass, and the series resistance placed in a separate ventilated compartment. The moving element is asserted to be light but strong, and no iron other than repulsion vanes is used in the area of the exciting coil.

Electrical Patents

Announced by U. S. Patent Office

(Issued Sept. 13, 1927)

16,737 (reissue). ELECTRIC SWITCH; E. L. Connell, Cleveland, Ohio. App. filed April 20, 1922. As applied to electric tools.

1,642,001. AUTOSTARTER FOR INDUCTION MOTORS; H. E. White, Wilkinsburg, Pa. App. filed May 25, 1925. Having an electromagnetic line switch adapted to so make and break the motor circuit as to avoid destructive arcing and burning of the switches.

1,642,025. CROSS-ARM; R. F. Hosford, Montclair, N. J. App. filed Dec. 28, 1923. Using a reduced amount of timber.

1,642,027. SWITCH MECHANISM; O. S. Jennings, Brooklyn, N. Y. App. filed Dec. 2, 1920. Safety switch.

1,642,028. SYSTEM OF CONTROL; H. H. Johnston, Edgewood, Pa. App. filed Dec. 30, 1920. For railway cars.

1,642,031. ELECTRICAL DISTRIBUTION SYSTEM; A. H. Kehoe, Rutherford, N. J. App. filed June 30, 1925. Low-voltage network system adapted to receive energy from a plurality of relatively high-voltage feeder circuits.

1,642,032. CONTROL SYSTEM; H. L. Keith, Wilkinsburg, Pa. App. filed May 23, 1919. Motor-accelerating and speed-control system.

1,642,034. SYSTEM OF ELECTRICAL DISTRIBUTION AND CONTROL; C. F. Kettering, and W. A. Chryst, Dayton, Ohio. App. filed Sept. 14, 1916. Farm-lighting system.

1,642,039. THERMAL RELAY; H. D. Matthews, Mansfield, Ohio. App. filed April 28, 1925. With variable time relay.

1,642,041. INDUCTION-TYPE FREQUENCY CHANGER; A. Nyman, Swissvale, Pa. App. filed Jan. 7, 1922. Wherein alternating currents of commercial frequencies are translated into currents of higher frequencies, such as are employed in wireless-transmission systems.

1,642,042. ELECTRICAL BINDING TERMINAL; J. L. Polk, La Grange, Ill. App. filed Feb. 9, 1925.

1,642,057. ARMATURE; V. G. Apple, Dayton, Ohio. App. filed Aug. 14, 1925. With double windings, either of which may produce or receive current independently of the other.

1,642,061. TIME-LIMIT RELAY; C. A. Butcher, East Pittsburgh, Pa. App. filed May 28, 1924.

1,642,070. SHORT-CIRCUITING DEVICE; P. M. Hengstenberg, Wilkinsburg, Pa. App. filed July 27, 1922. Centrifugally operated mechanism for repulsion start motors.

1,642,142. OUTLET BOX; H. R. Cook, Chicago, Ill. App. filed March 9, 1925.

1,642,197. CLAMP-ON ELECTRIC HEATER; P. L. Fowler, Spokane, Wash. App. filed Nov. 10, 1925. For range boilers; a type of heater which is clamped about the preiphery of the boiler.

1,642,198. HIGH-FREQUENCY FURNACE CIRCUIT; F. Gerth and W. Fischer, Berlin-Tempelhof, Germany. App. filed Feb. 13, 1926.

1,642,223. HEATING ELEMENT AND METHOD OF MAKING THE SAME; V. A. Bokeer, Minneapolis, Minn. App. filed Aug. 18, 1924. In which the heat coil and terminals are formed of a single continuous piece of wire.

1,642,224. BATTERY BINDING POSTS; L. G. Bowen, Bedford, Iowa. App. filed April 9, 1926. For a storage battery.

1,642,227. BLOW-OUT ARRANGEMENT FOR ELECTRIC SWITCHES; F. D. Bremner, London, England. App. filed Aug. 19, 1925. Where an electric switch has to break a current of considerable magnitude in a location where it is difficult to provide the space necessary for drawing out and extinguishing the arc. Consists in providing that the principal part of the drawing out and extinguishing of the arc is performed by an auxiliary switch which can be at a reasonable distance away from the main circuit-breaking device and is brought into circuit by the small arc produced at the contacts of the main circuit-breaking device.

1,642,234. STATION-INDICATING DEVICE; W. B. Feeley and W. Danmar, Jamaica, N. Y. App. filed Dec. 10, 1925. For transit system.

1,642,239. INDICATING DEVICE FOR LIGHTNING ARRESTERS; L. R. Golladay, Wilkinsburg, Pa. App. filed May 10, 1922.

1,642,240. LIGHTNING ARRESTER; L. R. Golladay, East Pittsburgh, Pa., and I. R. Smith, Pittsburgh, Pa. App. filed Oct. 14, 1924.

1,642,241. PROTECTIVE DEVICE; L. R. Golladay, East Pittsburgh, Pa. App. filed April 24, 1925. Means for producing a visual indication of the failure of lightning arresters employed in modern distribution systems and for disconnecting such arresters from the lines.

1,642,257. TROLLEY HARP AND CONTACT DEVICE; S. Maggio, Pittsburgh, Pa. App. filed Jan. 5, 1926.

1,624,284. THERMOSTATIC CIRCUIT CONTROLLER; F. W. Wood, Montclair, N. J. App. filed Jan. 17, 1923.

1,642,288. ELECTROMAGNETICALLY OPERATED DEVICE; C. D. Ainsworth, Wollaston, Mass. App. filed Sept. 1, 1922. A potential-operated tripping device.

1,642,339. WALL LIGHT; M. I. Kast, Harrisburg, Pa. App. filed July 23, 1926.

1,642,343. INDUCTIVE LIMITING DEVICE FOR ALTERNATING CURRENTS; F. Raimondi, Milan, Italy. App. filed Aug. 11, 1925.

1,642,345. ELECTRICAL CONNECTER; J. B. Telford, Peckville, Pa. App. filed Aug. 25, 1926.

1,642,359. ELECTRIC FURNACE; D. Groese, London, England. App. filed Dec. 1, 1926. The production or reduction of metals from their ores.

1,642,397 to 1,642,408 inclusive. METHOD AND MEANS FOR PROTECTING LIQUID-INSULATED ELECTRIC APPARATUS; M. Buchholz, Cassel, Germany. Apps. filed Sept. 15, 1922, and April 16, 1925. Utilizing the gases of decomposition to operate protective means; utilizing a supply of gas, such as air, inclosed in a container mounted in the oil-filled vessel in close vicinity to the apparatus to be protected, such gas being liberated and allowed to ascend in the insulating liquid whenever a predetermined temperature of the oil is exceeded. The ascending air bubbles will then cause a variation of the insulating capacity of the liquid between the terminals of a protective circuit, thereby effecting the switching out of the apparatus or some other protective operation.

1,642,413. ALARM GAGE; B. R. Faunce, Riverside, N. J. App. filed June 2, 1923. Adapted for use in connection with volatile liquids.

1,642,436. SEARCHLIGHT; C. E. Fraser, Brooklyn, N. Y. App. filed Sept. 4, 1920. Arc lamps operated under high current density.

1,642,438. ELECTRIC TRANSMISSION SYSTEM; E. Granat, Paris, France. App. filed May 14, 1923. Particularly applicable to the propulsion of vessels and to the traction of vehicles, as well as to all transmission of power between a driving shaft rotating at constant speed (as in Diesel motors) and an actuated shaft for which a continuous variation of speed and reversal of motion are desired.

1,642,448. SUPERADJUSTABLE GENERATOR; H. W. Lavigne, Worcester, Mass. App. filed Jan. 30, 1925. Frame in two parts and hinged to provide ready means of maintenance.

1,642,452. ELECTRODE FEEDING MEANS; G. A. Lovett, Detroit, Mich. App. filed Jan. 27, 1921. For use in maintaining a supply of metallic electrode material to an electric arc.

1,642,470. ELECTRICAL TRANSFORMER CORE OR MAGNETIC CIRCUIT; C. M. Welsh, Ogden, Ark. App. filed Oct. 24, 1921.

1,642,471. ELECTRICAL TRANSFORMER CONTAINING CASE; C. M. Welsh, Ogden, Ark. App. filed Oct. 24, 1921.

1,642,491. ELECTRICAL T CONNECTER; B. Dibner, Brooklyn, N. Y. App. filed March 31, 1924.

1,642,492. ELECTRICAL T CONNECTER; A. B. Dibner, Brooklyn, N. Y. App. filed June 17, 1925.

Foreign Trade Opportunities

Following are listed opportunities to enter foreign markets. Where the item is numbered, further information can be obtained from the Bureau of Foreign and Domestic Commerce, Washington, by mentioning the number:

Purchase or agency is desired in Prague, Czechoslovakia (No. 27,424), for automobile storage batteries.

Purchase or agency is desired in Sydney, Australia (No. 27,513), for heating and cooking appliances.

Purchase and agency are desired in Stockholm, Sweden (No. 27,510), for household electric appliances and neon lamps.

An agency is desired in Prague, Czechoslovakia (No. 27,481), for household electric refrigerators.

An agency is desired in Geneva, Switzerland (No. 27,483), for household and commercial electric refrigerators.

Purchase is desired in Prince Rupert, Canada (No. 27,533), of theater lighting fixtures and electric signs.

An agency is desired in Vienna, Austria (No. 27,433), for electric specialty tools.

Purchase or agency is desired in Manchester, England (No. 27,480), for electric vacuum cleaners.

New Trade Literature

CONTROLLERS.—Bulletin GEA-203A issued by the General Electric Company, Schenectady, N. Y., covers its printing-press controllers, for slip-ring motors driving small presses, folders, flat-bed presses, lithographic presses, waxing machines, small rotary presses, offset presses and cutting and creasing presses.

AUTOMATIC TRANSFER SWITCH.—The Sundh Electric Company, Inc., 5 Avenue C, Newark, N. J., is distributing form No. 56, which describes and illustrates the "Sundh" automatic transfer switch.

FURNACE.—The Combustion Engineering Corporation, 200 Madison Avenue, New York City, is distributing catalog FF-2, which describes and illustrates the "C-E Fin" furnace, a water-cooled furnace which eliminates wall maintenance and increases boiler capacity.

AUTOMATIC ELECTRIC MELTING POTS.—The Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., has issued a leaflet describing and illustrating its automatic electric melting pots.

REVERSING MOTOR-PLANER DRIVE.—Bulletin No. 1140 issued by the Allis-Chalmers Manufacturing Company, Milwaukee, describes and illustrates its reversing-motor, planer-drive, constant-voltage equipment.

ELECTRIC CLOTHES WASHER.—The Blue Bird Appliance Corporation, St. Louis, is distributing a folder describing the new "Blue Bird" electric clothes washer.

WINCHES, CRANES AND DERRICKS.—Bulletin No. 30 issued by the Silent Hoist Company, 762 Henry Street, Brooklyn, N. Y., describes and illustrates the "Silent Hoist" winches, cranes and derricks for gasoline and electric motor trucks and tractors.

ELECTRIC HEATING DEVICES.—The Acme Electric Heating Company, 1207 Washington Street, Boston, has issued catalog C, entitled "Acme Electric Heating Heat Control and Resistor Units," including various electrical household appliances.

PYROMETER.—The Pyrometer Instrument Company, 74 Reade Street, New York City, is distributing a leaflet describing and illustrating a simplified pyro-optical pyrometer.

SWITCHING AND CONTROL EQUIPMENT.—Bulletins GEA-203A, GEA-45A, GEA-793, GEA-811 and GEA-267 issued by the General Electric Company, Schenectady, N. Y., describe and illustrate its printing-press non-reversing controllers, type "MD-2" motor-operated timer for operation of oil circuit breakers in alternating-current reclosing service, automatic switching equipment for synchronous motor-generators in steel-mill service, its alternating-current jack type disconnecting switches, and CR1038 motor-starting switches for small induction motors.

FLEXIBLE FIXTURE HANGERS.—Bulletin No. 2,102 issued by the Crouse-Hinds Company, Syracuse, N. Y., covers its various types of flexible fixture hangers.

TURBINES.—Leaflet 3907-C issued by the Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., describes turbines for mechanical drive in capacities of 5 hp. to 750 hp. The leaflet also contains a number of illustrations.

ELECTRIC INDUSTRIAL TRUCKS.—The Yale & Towne Manufacturing Company, Stamford, Conn., has issued catalog No. 1-K. It contains full details of Yale storage-battery industrial trucks, tractors and trailers with information regarding each of these units of Yale equipment for handling materials.

CONCRETE INSERTS.—The Midwest Steel & Supply Company, Inc., Bradford, Pa., is distributing a pamphlet covering the Midwest "1-4" concrete inserts.